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TAUBITZ (A.). **Die Bekämpfung der Rübenwanzen-Kräuselkrankheit in Niedersachsen.** [The control of the Beet bug-crinkle disease in Lower Saxony.]—*Zucker*, 4, 10, pp. 210–211, 1 map, 1951.

The continued spread of beet crinkle virus in Lower Saxony, Germany [*R.A.M.*, 27, p. 456], necessitated an amplification of the existing orders for the control of the disease in 1951, involving the obligation of notification in the case of any area in which the beet leaf bug [*Zosmenus quadratus*], responsible for the transmission of the virus, has been observed or is suspected to occur. A zone covering a total of ten administrative districts has been declared infested and is to be continuously inspected during the period from 15th June to 1st August. Diseased plants will be dusted and then destroyed, or in the case of over 5 per cent. infection the entire crop must be dusted twice by the owner with suitable preparations. It is estimated that the fodder and sugar beet crops within the infested zone will cover an area of some 25,000 ha., requiring the employment of 85 inspectors, each of whom will be responsible for 300 ha.

GIRGINKOÇ (H. R.). **Untersuchungen über die 'zwarte houtvatenziekte' der Futter- und Zuckerrübe verursacht durch Pythium irregulare Buisman.** [Studies on the 'black xylem vessel disease' of the Fodder and Sugar Beet caused by *Pythium irregulare* Buisman.]—*Meded. LandbHoogesch. Wageningen* 129, 61 pp., 5 pl., 1 fig., 3 graphs, 1951. [English summary.]

This is a fully tabulated survey and discussion of the methods and results of the author's exhaustive greenhouse and field studies at Wageningen, Holland, on the 'black xylem vessel disease' of fodder and sugar beets, first described by Brandenburg (under the name of 'reclamation disease') in 1931 [*R.A.M.*, 10, p. 487]. The trouble is confined to sandy soils, mostly of the lighter type, though it may occur on sandy loam. No difference in respect of soil structure could be observed between healthy and diseased fields. A high incidence of the disease is promoted by wet, cool weather during May and June.

Several strains of *Pythium irregulare* [ibid., 29, p. 634] and one of *P. debaryanum* were isolated from diseased beets, and in greenhouse inoculation experiments they differed in pathogenicity. All were able to cause damping-off and to attack the secondary roots in a later stage, but only a few isolates of *P. irregulare* were able to induce the black vessel symptoms, the development of which was caused by toxic metabolic products secreted in the lateral roots and transported through the water-conducting tissues. Fodder and sugar beets appeared to be equally susceptible to the black vessel disease.

The nutritional status of the soil did not directly influence the severity of the disease in pot experiments with humus-sand, but plants supplied with a complete fertilizer recovered more rapidly than those given no amendment. No correlation could be established between the oxygen content of the soil atmosphere and the occurrence of the vascular discoloration, the severity of which, however, increased

with a decline in the pH level. Thus, at pH 4·9 about 35 per cent. of the inoculated plants succumbed within a week and half the remainder during the following weeks; at 5·8 the loss of 28 per cent. of the plants did not occur until the end of the second week; and at 7·1 there was no mortality. At a moisture content of 20 to 50 per cent. of the water-holding capacity of the soil the disease is more severe at 20° and 25° C. than at 15°, whereas at 80 per cent. there is little difference between the symptoms at the three temperatures. The number of diseased plants and the virulence of the symptoms increase with a rising moisture content of the soil.

Wallace (G. B.). **Diseases of French or Dwarf Beans.**—*Pamphl. Dep. Agric. Tanganyika* 51, 11 pp., 4 pl., 1951.

French beans (*Phaseolus vulgaris*) are an important crop in Tanganyika both for food and for the production of seed for export. In this article, written chiefly for the large-scale European grower on whose extensive fields disease can sometimes attain significant proportions, bean diseases are treated according to the parts of the plant affected. The source of infection, methods of spread, and the control measures are given.

Halo blight (*Pseudomonas* [*medicaginis* f.sp.] *phaseolicola*) [*R.A.M.*, 19, p. 187; 30, p. 79], though not very common, is the only bacterial disease of the crop so far recognized in the Territory. Seed growers are provided by the seedsman abroad with the varieties to be multiplied, but plants from such seeds should be carefully inspected for seed-borne diseases. Of the resistant varieties listed the popular Prince has proved to be susceptible locally. Mosaic virus [ibid., 30, pp. 79, 176, 181], present in all districts, though usually insignificant to moderate in extent, is potentially serious. Active control of the disease is recommended. Angular leaf spot (*Isariopsis griseola*) [ibid., 31, p. 3], the commonest disease of beans in the Territory, was very serious in 1947 when it started early and the rains were prolonged. As the disease is believed to spread from infected plants growing out of season, the best control is by restricting sowing to one time of the year, at the end of the rains. If these are likely to be prolonged, sowing date might be postponed, though not unduly, and it should never spread over a long period on any one farm or even on a group of neighbouring farms in order to prevent disease spread from early to late sowings. Spraying with Bordeaux mixture or dusting with sulphur would be beneficial and the expense involved justified on multiplication plots at least. A serious outbreak of anthracnose (*Colletotrichum lindemuthianum*) [ibid., 30, p. 79] on a farm early in 1950 showed the potential destructiveness of the disease which, though fairly widespread, was only moderately serious in Tanganyika. If the grower is not certain that his seeds are from a healthy crop, treatment with a fungicide such as ceresan at 2·5 oz. per cwt. would be advisable. The importance of bean rust (*Uromyces appendiculatus*) [ibid., 30, p. 79] varies greatly in different years. In addition to control measures already recommended [ibid., 26, p. 180; 29, p. 497] early sowing should be avoided. *Sclerotinia* rot (*Sclerotinia sclerotiorum*) [ibid., 24, p. 93] is not very common but can be destructive under certain circumstances. It is dependent on high humidity and more or less stagnant air, close planting, the presence of weeds and dense wind-breaks. Rotation with cereals may be necessary unless an improvement in the air conditions can be effected before another crop is sown. Blistering, the second symptom of yeast spot (*Nematospora coryli*) [ibid., 19, p. 187], is now recognized to be a result of insect-carried spores. The affected parts of the seed are usually raised as brown or orange blisters, which may be small and scattered or single and large. Blisters, like yeast spots, may bear tiny black marks. Spores of the fungus are usually numerous in the affected part of the cotyledon. DDT (1 per cent. dust or 0·1 per cent. spray) applied several times, perhaps weekly, after the [unspecified] insect has appeared and until the pods start to dry is suggested as a possible effective control measure. Agrocide powder is also

recommended; either insecticide could be added to copper sprays, agrocide at 4 lb. per 100 gals.

Bridgmon (G. H.) & Walker (J. C.). **The relation of southern Bean mosaic to black root.**—*Phytopathology*, 41, 10, pp. 865–871, 2 figs., 1951.

Certain bean [*Phaseolus vulgaris*] varieties, with widely divergent sources of resistance to southern bean mosaic virus [*R.A.M.*, 30, p. 443], e.g., Idaho Refugee (resistance derived from Corbett Refugee), Stringless Blue Lake (White Crease-back), and Great Northern U.I. 123 and U.I. 59 (Great Northern), developed systemic necrosis on inoculation by the approach-graft method. The symptoms on mature plants were similar to those of black root [ibid., 29, p. 284]. On the other hand, varieties susceptible to southern bean mosaic virus remained free from necrosis and black root symptoms when similarly treated. The results of previous experiments on the production of black root by approach grafts between varieties resistant and susceptible to bean virus 1 [bean mosaic virus: loc. cit.] were confirmed. The reddish-brown to black necrosis induced by southern bean mosaic virus tended to be milder than the grey to black form caused by bean mosaic virus.

Hartwig (E. E.) & Lehman (S. G.). **Inheritance of resistance to the bacterial pustule disease in Soybean.**—*Agron. J.*, 43, 5, pp. 226–229, 1951.

The CNS soy-bean variety has shown a high degree of resistance to bacterial pustule (*Xanthomonas phaseoli* var. *sojense*) [*R.A.M.*, 30, p. 258, 443], amounting virtually to immunity, of recent years in North Carolina [cf. ibid., 9, p. 359]. Three progenies were grown and evaluated in the F_3 generation from crosses of CNS with Ralsoy, Volstate, and Ogden (slightly, moderately, and highly susceptible, respectively), in each of which resistance appeared to be a simple recessive. Three recovered resistant F_3 lines were hybridized with susceptible strains and their behaviour in the F_2 and F_3 generations in respect of resistance to bacterial pustule resembled that of their CNS parent.

One other resistant parent, F.C. 31592, was studied in crosses with CNS, the moderately susceptible Roanoke, and the susceptible Acadian. The results indicated genotypical similarity between CNS and F.C. 31592 as regards resistance to *X. phaseoli* var. *sojense*.

It would appear that resistance to bacterial pustule is recessive and conditioned by a single major gene pair. The differences in degree of susceptibility of the parent lines and the range in degree of susceptibility among progenies from susceptible parents indicate that the dominant allele is modified by other genes determining the degree of susceptiblity.

Bakker (Martha). **Bestrijding van de Phomopsisziekte in Zaadwortelen.** [Control of the *Phomopsis* disease in seed Carrots.]—*Tijdschr. PlZiekt.*, 57, 5, pp. 157–167, 1 fig., 1 graph, 1951. [English summary.]

In West Friesland, Holland, where carrots are grown for seed, *Phomopsis dauci* [*R.A.M.*, 31, p. 99] is responsible for losses of economic importance, destroying up to 80 per cent. of the umbels. Plants in cheesecloth cages remained healthy. Field trials were carried out in two localities with a number of fungicides that had given promising results in laboratory tests. The summer of 1949 was too dry to permit of extensive infection, and no conclusion could be reached as to the relative merits of the chemicals, but in the more severe outbreak of 1950 the best control was secured in both areas with 1·5 per cent. Bordeaux mixture, applied at nine- to ten-day intervals from the appearance of the first flower buds, while other promising materials included copper Bayer, zerlate, dithane Z78, and tripomol, all at 0·25 per cent.

Grogan (R. G.) & Snyder (W. C.). **Occurrence and pathological effects of Stemphylium radicinum (M. D. & E.) Neerg. on Carrots in California.**—Abs. in *Phytopathology*, 41, 10, p. 939, 1951.

Much confusion exists in the American literature regarding the identities and pathological functions of *Stemphylium radicinum* [*R.A.M.*, 30, pp. 140, 301] and *Alternaria porri* f. [sp.] *dauci* [*A. dauci*: ibid., 26, p. 405]. The latter, characterized by a long spore with an appendage, is best known as the agent of a leaf blight of carrot, whereas the former, which has no conidial appendage, was first described as the cause of black root rot of the same host and has not hitherto been reported responsible for leaf blight in nature. During the past year, however, *S. radicinum* has been found on four separate occasions on carrot leaves in the field. It is commonly seed-borne and can attack the plants at all stages of growth, causing damping-off of seedlings, superficial spotting of uninjured roots, deep-seated black rot of wounded ones, and blight of the petioles, leaves, and seed umbels.

Grogan (R. G.), Welch (J. E.), & Bardin (R.). **The use of mosaic-free seed in controlling Lettuce mosaic.**—Abs. in *Phytopathology*, 41, 10, p. 939, 1951.

All the commercial lettuce seed lots tested in California harboured from 1 to 3 per cent. lettuce mosaic virus [*R.A.M.*, 30, p. 302]. Several pounds of mosaic-free seed of the Imperial 615 and Great Lakes varieties were produced by growing seedlings in an insect-free greenhouse and roguing out all infected plants before transplanting to a mosaic-free locality. Several test plots, each measuring about 180 ft. sq. and surrounded by commercial lettuce, were sown with samples of the mosaic-free seed in the Salinas Valley region in the spring of 1951. The percentage of infection in these areas was substantially reduced, indicating the practicability of combating the disease by this method [cf. ibid., 31, p. 5].

Pettinari (Carla). **Stemphylium botryosum Wallr. su foglie di Lattuga.** [*Stemphylium botryosum* Wallr. on leaves of Lettuce.]—*Ann. Sper. agr.*, N.S., 5, 3, pp. 607–616, 5 figs., 1951. [English summary.]

From spots on the leaves of lettuces growing in Apulia, Italy, the author obtained a culture of *Pleospora herbarum* [*R.A.M.*, 10, p. 430; 18, p. 496; and next abstract].

Goossens (J.). **Een bladvlekkenziekte op jonge Slaplanten veroorzaakt door Pleospora herbarum (Pers.) Rabenh.** [A leaf spot disease of young Lettuce plants caused by *Pleospora herbarum* (Pers.) Rabenh.]—*Tijdschr. PlZiekt.*, 57, 5, pp. 170–171, 1 fig., 1951.

Young lettuce plants in Dutch nurseries, especially in the vicinity of Rotterdam, were attacked during January and February, 1950, by *Pleospora herbarum* [*R.A.M.*, 24, p. 42 and preceding abstract]. Infection was generally mild, but in one case 70 per cent. of the crop was involved. Control measures consisted merely in the removal of diseased leaves and filling up gaps in the stand.

Friedman (B. A.). **Pseudomonas marginalis as the cause of soft rot of imported Witloof Chicory.**—*Phytopathology*, 41, 10, pp. 880–888, 1 fig., 1 graph, 1951.

A bacterial soft rot of witloof chicory imported from Belgium is described from the Division of Fruit and Vegetable Crops and Diseases, U.S. Department of Agriculture, New York. Small, light to deep brownish-vinaceous lesions, usually originating at the midribs of injured outer leaves, expand most rapidly in a humid atmosphere at 75° to 80° F., though appreciable progress is also made at 36° to 48°, changing to clay or sayal, and ultimately to cinnamon, russet, or argus brown, by which time the entire head is transformed into a shiny, malodorous mass of decomposed tissue.

Morphological and physiological studies were made of several organisms isolated from infected chicory leaves. From a laboratory comparison of *Pseudomonas cichorii* [*R.A.M.*, 17, p. 416] and two strains of *P. marginalis* [ibid., 14, p. 16; 20, p. 451], and from the original description of the latter pathogen (*J. agric. Res.*, 13, pp. 380–387, 1918), the agent of the imported chicory disease would appear, despite certain discrepancies, to be *P. marginalis*. It induced a soft rot on inoculation into lettuce, endive, cucumber, onion, potato, string bean (*Phaseolus vulgaris*), and broad bean.

Control measures against the soft rot should comprise careful handling to avoid bruising and the maintenance of a lower transit temperature (32° to 33°) than that employed at present (36°).

THUNG (T. H.) & HADIWIDJAJA (T.). **Groeistof in verband met virusziekte, in het bijzonder bij Arachis hypogaea.** [Growth substance in relation to virus disease, especially of *Arachis hypogaea*.]—*Tijdschr. PlZiekt.*, 57, 3, pp. 95–99, 1 pl., 1951. [English summary.]

The senior author has shown (*Landbouw*, 19, pp. 286, 337–347, 1947) that the witches' broom disease affecting groundnuts in Java, originally described by Rutgers (*Meded. Afd. PlZiekt., Buitenz.*, 6, 1913), is caused by a virus. It is responsible for a reduction of internodal growth, the stimulation of axillary buds, the formation of numerous small, stiff leaves, and a loss of positive geotropism in the pod stalks, which after a time begin to grow upwards. The application to decapitated healthy groundnut plants of β-indoleacetic acid at a concentration of 10^{-4} gm. mol. per l. suppressed the growth of the uppermost axillary buds but did not counteract the other symptoms of witches' broom. Applied to cuttings and leaves of sweet potato suffering from witches' broom (also of virus origin *Landbouw*, 19, p. 286, 1947) [cf. *R.A.M.*, 28, p. 444; 30, p. 625] and of *Ageratum conyzoides* infected by mosaic virus [cf. ibid., 24, p. 122], the auxin failed to stimulate rooting, whereas comparable healthy material responded by increased and more rapid root growth. It is concluded that growth substances, if present at all in virus-diseased plants, are unable to exert their full influence.

IBRAGIMOV (G. R.). **A new disease of Pepper and its control.**—*Sad i Ogorod* (*Orchard and Garden*), *1950*, 8, p. 26, 1950. [Abs. in *Hort. Abstr.*, 21, 1, p. 85, 1951.]

A description is given of the symptoms of a disease of [chilli] peppers (*Capsicum* [*annuum*]) on the shores of the Black Sea caused by *Colletotrichum multisetorum*. Control measures include crop rotation, seed treatment with hot water at 50° C. for 15 to 20 mins. or by dry heat for 30 mins. at 55°, and spraying with 1 per cent. Bordeaux mixture before flowering and 15 to 20 days after.

ROGERS (D. P.). **The truffle fungi.**—*Trans. N.Y. Acad. Sci.*, Ser. ii, 13, 6, pp. 142–143, 1951.

In this brief note the author has assembled some interesting data on the nature of truffles (Tuberaceae) [*R.A.M.*, 19, p. 257], their mode of dissemination, plant associations, and methods of collection.

PARRIS (G. K.). **Downy mildew resistant strains of Watermelon from the Dominican Republic, West Indies.**—*Plant Dis. Reptr*, 35, 9, pp. 399–401, 1 fig., 1951. [Multilithed.]

Downy mildew (*Pseudoperonospora cubensis*) [*R.A.M.*, 30, p. 504] was present in watermelon plots at the Florida Agricultural Experiment Stations, Leesburg, during 1948 and by the middle of the growing season it was evident that watermelon strains from the Dominican Republic possessed a useful degree of resistance to the disease. Because of losses from wilt (*Fusarium oxysporum* f. [*bulbigenum* var.]

niveum) [ibid., 30, p. 453] only open-pollinated melons were saved. Seeds from 14 plants were sown in wilt-infested soil in 1949, when downy mildew severely attacked unsprayed commercial melons growing near by, but the Dominican strains again showed resistance although the leaves gradually succumbed as the fruit matured. From plants appearing most resistant selfed melons were saved and in 1950 28 inbred lines were grown in wilt-infested soil, no fungicides being applied to them or to several adjacent commercial varieties. The latter, all resistant to wilt and many to anthracnose (*Colletotrichum lagenarium*) [ibid., 30, p. 302] as well, were killed by mildew before the fruit matured. The Dominican strains again showed high resistance and 12 which appeared least susceptible were used as parents in crosses with lines resistant to wilt or anthracnose or both in order to develop varieties resistant to all three diseases.

ANDERSON (C. W.). **Some preliminary observations on cucurbit viruses in Florida.**—*Plant Dis. Reptr*, 35, 5, pp. 233–234, 1951. [Multilithed.]

In 1950 virus 1 from cantaloupe, virus 2 from *Commelina gigas*, and virus 3 from Crookneck squash were collected in central Florida. Viruses 1 and 2 were found to be strains of cucumber mosaic virus [*R.A.M.*, 30, p. 444 and next abstract], but were not identical. Virus 3 was easily differentiated from the well-known mechanically transmissible viruses infectious to cucurbits by its host range, which is restricted to squash, cucumber, and watermelon. The common name 'southern squash mosaic' [loc. cit.] is proposed for this virus until its relationship with other viruses can be determined more precisely.

ANDERSON (C. W.). **Further observations of some cucurbit viruses from central Florida.**—*Plant Dis. Reptr*, 35, 9, pp. 396–398, 1951. [Multilithed.]

Cross protection tests between the Florida V1 and V2 virus isolates [see preceding abstract] and Price's indicator strain of cucumber mosaic virus [*R.A.M.*, 31, p. 121] confirmed that V1 and V2 are strains of this virus. Southern squash mosaic virus [see preceding abstract] is distinct from V1 in that infection of cucumber or watermelon plants by both viruses caused a more severe disease than either alone; necrotic primary lesions on watermelons inoculated with sap from cucumber plants were more numerous and developed more rapidly if the cucumbers were infected with both viruses than infected with V1 alone; and the cucumber mosaic virus did not tend to predominate over southern squash mosaic virus, or the reverse, in either host. Although the symptoms of southern squash mosaic differ from those of cucumber mosaic in such hosts as cucumber and squash, the results of greenhouse tests indicated that cucumber plants infected with both viruses cannot be distinguished with certainty from those infected with cucumber mosaic alone. The V1 and V2 strains of cucumber mosaic were readily transmitted from [chilli] pepper to the same host but not from chilli to cucumber.

JUGANOVA (Mme O. N.). **An effective method for controlling Vine mildew.**—*Sad i Ogorod* (*Orchard and Garden*), *1950*, 2, pp. 35–37, 1950. [Russian. Abs. in *Hort. Abstr.*, 20, 3, p. 210, 1950.]

Vine mildew (*Uncinula necator*) [*R.A.M.*, 30, p. 357] has been effectively controlled in Russia by spraying with a copper naphthenate preparation [see above, p. 127] in early spring before bud-burst.

VERDEREVSKY (D. D.). **The effect of spraying the lower surface of leaves in controlling mildew.**—*Vinod. i Vinograd., U.S.S.R., 1950*, 4, p. 28, 1950. [Russian. Abs. in *Hort. Abstr.*, 20, 3, p. 210, 1950.]

An experiment [in U.S.S.R.], in which the upper, lower, and both surfaces of vine leaves were sprayed with Bordeaux mixture and copper naphthenate [see

preceding abstract] for the control of downy mildew (*Plasmopara viticola*) [*R.A.M.*, 30, p. 357 and next abstract], demonstrated that application to both surfaces was far more effective than to one only, and to the lower surface than to the upper.

VERDEREVSKY (D. D.) & VOJTOVICH (K. A.). **Spraying vineyards according to incubation period.**—*Vinod. i Vinograd., U.S.S.R., 1950*, 6, pp. 28–32, 1950. [Russian. Abs. in *Hort. Abstr.*, 20, 4, p. 352, 1950.]

Investigations carried out at the Institute for Plant Protection, Moldavia, demonstrated that spraying vineyards with Bordeaux mixture on the last day of every incubation period of mildew [*Plasmopara viticola*] during the season gave complete protection of yield, even in years highly favourable to the disease [*R.A.M.*, 23, p. 142; 25, p. 487; 30, pp. 12, 599, and preceding abstract]. A co-ordinated spray-warning system for vine-growing areas in Rumania is advocated.

DELP (C. J.), HEWITT (W. B.), & NELSON (K. E.). **Cladosporium rot of Grapes in storage.**—Abs. in *Phytopathology*, 41, 10, pp. 937–938, 1951.

A periodical storage rot of grapes in California, characterized by well-defined, black, subepidermal lesions, becoming erumpent and olivaceous due to sporulation after a short incubation period at higher temperatures, was found to be caused by *Cladosporium herbarum* [cf. *R.A.M.*, 14, p. 492; 19, p. 25]. Both wounded and intact grapes contracted 100 per cent. infection when sprayed with a spore suspension and stored in a moist chamber. The optimum temperature for the development of the pathogen on potato dextrose agar was about 24° C., above which growth declined rapidly and ceased at 33°. Infection occurred over a range from 4° to 30°, with peaks for the Tokay and Emperor varieties at 21° and 24°, respectively. During the past season a close correlation was established between rainfall during or shortly before harvest and the incidence of *C. herbarum* in storage.

GAGNOTTO (ANNA V.). **La Vite come nuovo ospite di Sclerotium bataticola Taub.** [The Vine as a new host of *Sclerotium bataticola* Taub.]—*Ann. Sper. agr.*, N.S., 5, 3, pp. 541–542, 1 pl., 1951. [English summary.]

A progressive wilt of vines at Catanzaro, Italy, appearing in the first year after grafting and causing death two years later, is attributed to *Macrophomina phaseoli*.

NELSON (K. E.). **Effect of humidity on infection of table Grapes by Botrytis cinerea.**—*Phytopathology*, 41, 10, pp. 859–864, 2 graphs, 1951.

In further studies at the Division of Fruit and Vegetable Crops and Diseases, U.S. Department of Agriculture, Fresno, California, on the factors influencing infection of Tokay grapes by *Botrytis cinerea* [*R.A.M.*, 30, p. 505], the duration of the wet period was not significant when clusters were inoculated and kept wet for up to 18 hours at 12° C., then dried and incubated at relative humidity levels exceeding 94 per cent. The incidence of berry infection was 85 per cent. both at one hour and at the maximum wet period. At lower humidity levels the wet period assumed increasing significance.

At relative humidity levels of 85 to 90 per cent. considerably more infection occurred through the capstem than through the skin of the berries, owing either to invisible residual water round the former site or to rapid transpiration from that area, which had the effect of prolonging the shorter wet periods. Lots of individual berries with waxed capstems, similarly inoculated and kept wet for 12 hours, developed 3 per cent. infection after drying and incubation at 62 per cent. relative humidity, the corresponding amounts at 80, 91, and 97 per cent. relative humidity being 25, 53, and 96 per cent. respectively. Control lots dusted with conidia and not moistened contracted 3 per cent. infection at 62 and 80 per cent. relative humidity, while the corresponding figures at 91, 97, and 99 per cent. relative

humidity were 28, 90, and 100 per cent., respectively. Other lots dusted with conidia showed a rapid increase in the incidence of infection within the range of 89 to 95 per cent. relative humidity.

Microscopic examination revealed conidial germination on glass slides and skin of grapes incubated at relative humidity levels as low as 92 and in one case at 90 per cent.

FREITAG (J. H.). **Host range of the Pierce's disease virus of Grapes as determined by insect transmission.**—*Phytopathology*, 41, 10, pp. 920–934, 3 figs., 1951.

In inoculation experiments at the Division of Entomology and Parasitology, University of California, Berkeley, the Pierce's disease [lucerne dwarf] virus of vine [*R.A.M.*, 31, p. 47] was transmitted by means of three species of leafhoppers, *Draeculacephala minerva* (used in the majority of the tests), *Hordnia circellata*, and *Carneocephala fulgida* [ibid., 29, p. 8], to 75 species of plants in 23 families [ibid., 29, p. 245]. Proof of infection was established by recovery of the virus by previously non-infective leafhoppers and its transfer to test plants of Californian Common or Chilean lucerne and vine (mostly of the Emperor variety). New hosts discovered by this means include *Holcus halepensis* [*Sorghum halepense*], *Cynodon dactylon*, *Lolium multiflorum*, *L. perenne*, *Phleum pratense*, *Canna* sp., *Photinia arbutifolia*, *Cytisus scoparius*, *Melilotus alba* var. *annua*, alsike, crimson, red, and Ladino clovers, carrot, *Vinca major*, mint, vetch (*Vicia monanthus*), *Oenothera hookeri*, *Godetia grandiflora*, ivy, *Coprosma baueri*, *Sambucus coerulea*, *Lonicera japonica*, *Symphoricarpos albus*, and *Artemisia vulgaris* var. *heterophylla*.

Natural infection by the virus was demonstrated for 36 species (including 8 grasses, 9 ornamentals, and 13 weeds) in 18 families, among which were *Cynodon dactylon*, *Paspalum dilatatum*, *Rubus vitifolius*, *Acacia longifolia*, *Parthenocissus tricuspidata*, *Sambucus coerulea*, *Eugenia myrtifolia*, *Artemisia vulgaris* var. *heterophylla*, *Rosmarinus officinalis*, *Fuchsia magellanica*, and *Baccharis pilularis*.

Apart from vine and lucerne, no naturally infected plants and very few of the artificially infected ones developed symptoms of lucerne dwarf virus, among the latter being *M. alba* and its var. *annua*, *M. officinalis*, and *M. indica*. Many of the symptomless carriers serve as important reservoirs of infection for the natural spread of the disease.

The 22 species of Gramineae experimentally infected by the virus included, besides those already mentioned, *Avena fatua*, *Bromus catharticus*, *B. rigidus*, *Digitaria sanguinalis*, *Echinochloa crus-galli*, Sudan grass, *Hordeum murinum*, barley, *Poa annua*, *Phalaris minor*, *Pennisetum clandestinum*, and *Setaria lutescens*. Non-infective insects were obtained from eggs dissected out of barley leaves. The virus did not appear to be transmissible through the egg of *D. minerva*. Only a few individuals, insufficient for large-scale experimental work, developed in a number of attempts to rear the leafhopper vectors of lucerne dwarf virus.

HEINZE (K.). **Die Überträger pflanzlicher Viruskrankheiten (eine tabellarische Übersicht).** [The vectors of plant virus diseases (a tabulated survey).]—*Mitt. biol. Anst.* (*Reichsanst.*) *Landw., Berl.*, 71, 126 pp., 1951.

This useful compendium gives a survey of the insects responsible for the transmission of plant viruses, with supplementary information on the incubation period and bibliographical references; a list of insect-borne viruses and their vectors arranged under plant family names; and vector and virus indexes.

KENNEDY (J. S.). **A biological approach to plant viruses.**—*Nature, Lond.*, 168, 4282, pp. 890–894, 1951.

In this review of recent researches in the field of plant viruses from a biological

standpoint, the writer reiterates Leach's plea [*R.A.M.*, 20, p. 218] for more work on the relation between viruses and insects. The aspects surveyed include the preference of insects for virus-diseased plants [ibid., 31, p. 98], the benefit to the insect of feeding on such plants, and the effect of both on the plant's metabolism. It is only from a study of the whole biological complex from all aspects, including the ecological, that the role of each component will be understood.

BAWDEN (F. C.). **Plant pathology department.**—*Rep. Rothamst. exp. Sta., 1950*, pp. 69–78, 1951.

Electromicrographs of isolated intracellular inclusions from plants infected with tobacco mosaic, tomato aucuba mosaic [strain of tobacco mosaic], cabbage black ring, and henbane mosaic viruses at Rothamsted [cf. *R.A.M.*, 30, p. 557] showed them to consist largely of bundles of rod-shaped particles similar to those demonstrated in mounts of clarified infective sap [loc. cit.]. Rod-shaped particles were also detected in tobacco etch virus inclusion bodies but were overlain by other material, a fact suggesting that the bodies may have a membrane. The inclusions formed by cauliflower mosaic virus [ibid., 30, p. 306; 31, p. 2] were so stable that they could not be broken into fragments small enough for electron microscopy.

Electromicrographs of extracts from various organs of cacao plants infected by swollen shoot [cf. ibid., 30, p. 458] and of groundnut plants infected by rosette [cf. ibid., 31, p. 7] showed nothing not also present in comparable extracts from healthy plants. Groundnut rosette virus was transmitted mechanically [cf. ibid., 30, p. 141]; about 10 per cent. of healthy seedlings sap-inoculated from diseased plants became infected when previously placed in darkness for a few days and if an abrasive was used. Similar methods failed to transmit cacao swollen shoot virus, but the Rothamsted tobacco necrosis virus [ibid., 30, p. 306] was readily transmitted by inoculation to and from cacao leaves.

Evidence is accumulating that plant virus inactivated by ultraviolet light irradiation specifically interferes with infection by active virus.

When sugar beet leaves infected with virus yellows [ibid., 31, p. 159] were sprayed daily with 2 per cent. and 10 per cent. sucrose solutions the severity of the symptoms was increased in conditions of low light intensity, when normally they are masked. Spraying produced no symptoms in uninfected plants, though it increased their carbohydrate content. It was concluded that the external symptoms of yellows require a high sugar content, but are not directly caused by it.

Control measures against beet yellows virus were extensively practised in 1950, when a certification scheme for stecklings was introduced. In a field trial on the root crop late singling reduced incidence sufficiently to increase yield by about two tons per acre. Late singling had little effect on late sown crops but it reduced yellows in those sown in March because at the time of the first aphid migration there were more aphids per plant on unsingled than singled crops and many plants infected in the unsingled were removed at singling.

Experiments with henbane mosaic and sugar beet yellows viruses introduced by aphids under conditions of reduced light intensity, showed that there is no increase in host susceptibility comparable with that occurring with mechanically transmitted viruses [cf. ibid., 29, p. 427]. Differences in susceptibility comparable with those produced by varying illumination [ibid., 28, p. 207] were also produced by varying the amount of water supplied to plants before inoculation, those receiving abundant water developing many more local lesions than those kept in drier conditions. Differential watering appeared to have no consistent effect on the extent to which tobacco mosaic virus multiplied in systemically infected plants.

The readiness with which aphids become infective with potato leaf roll virus was ascertained to depend largely on the age of the plants on which they are fed. It seems likely that the concentration of infective virus reaches its maximum

early in the course of infection and then declines as leaf symptoms develop. This may partly account for the fact that in most years the main spread of leaf roll at Rothamsted occurs early in the season. Use was made of *Datura tatula*, which reacts more rapidly than potato, displays more definite symptoms, is more easily infected, and is a better source of the virus for aphids, to investigate some of the factors influencing transmission of leaf roll virus by *Myzus persicae* [cf. ibid., 29, p. 635; 30, pp. 533, 624]. The results confirmed the persistence of the virus for many days within the vector and its inability to infect healthy plants immediately after acquiring the virus. Aphids that had fed for two hours on infected plants became infective, but did not transmit the virus during the succeeding 24 hours. The delay period could be passed in feeding on diseased plants, and aphids which had fed on these for several days could infect healthy plants within 15 minutes.

A virus isolated from a naturally infected sugar beet at Lincoln appears to resemble yellow net virus [ibid., 31, p. 97]; preliminary tests indicated that aphids do not become infective until about two days after they have begun to feed on infected plants. Henbane mosaic, cauliflower mosaic, and cabbage black ring do not persist for more than a few hours in aphid vectors; the virus can be acquired and a healthy plant infected in less than two minutes. Cabbage black ring has a wider host range than cauliflower mosaic. It was demonstrated that aphids could become infective by feeding on detached epidermal strippings of leaves. When infective aphids were disturbed at intervals and prevented from feeding continuously they caused more infections than when left undisturbed. The probability that a puncture by an infective aphid would result in infection reached a maximum with punctures maintained for about half a minute.

Colonies of *M. persicae* were fed on turnip and sugar beet plants raised in a nutrient solution containing radio-active phosphorus (P^{32}) [ibid., 30, p. 2]. At the optimum concentration of P^{32} the aphids showed their first detectable radio-activity after 15 minutes. Activity increased during periods of 24 hours' feeding in a manner suggesting that aphids feed at the same rate during daylight and darkness.

Experimental evidence showed that potato leaf roll spread more in earlier than in later-planted plots, though rugose mosaic [potato virus Y] spread equally in all [see below, p. 200]. Of the plants adjacent to those infected with leaf roll 18 per cent. became infected at a spacing of nine inches, 8 per cent. at 18 in., and 2 per cent. at 36 in. In the progeny from a small-scale trial in 1949, when potato plants were sprayed at weekly intervals with DDT, parathion, and pestox III [ibid., 31, p. 68], the spread of leaf roll was reduced from 15 per cent. in unsprayed plots to 1 per cent., but rugose mosaic was unaffected.

Spore trapping in the open showed that the main deposition of *Erysiphe graminis* occurred between 15th June and 15th July. A study of some effects of wheat, winter [broad] beans, potatoes, and fallow in 1949 on the following wheat crop showed, in May, 1950, that 37 per cent. of wheat plants following wheat were infected by *Cercosporella herpotrichoides* [ibid., 30, p. 306] and 27 per cent. by *Ophiobolus graminis* [ibid., 29, p. 253]; wheat following beans, potatoes, and fallow had, respectively, 20, 20, and 6 per cent. plants infected by the former and none by the latter. Barley following wheat was also affected by *O. graminis*, though other crops were not. In a pot experiment application of nitrogenous fertilizer in autumn or early spring reduced severe infection of wheat straw at harvest by *C. herpotrichoides* from 77 per cent. to a mean of 15 per cent., whereas application in May did not appreciably reduce the disease. When rain was excluded from a pot experiment overhead watering in December and January had a greater effect than watering from below in increasing incidence of *C. herpotrichoides* and the number of plants killed by the disease.

Host plant nutrition was found to affect the proportion of plants that became infected by *Plasmodiophora brassicae* [see below, p. 195] when exposed to given spore

concentrations; clubbing was increased by high nutrient levels and their early application. The exceptionally wet summer induced the earliest and most severe outbreak of potato blight (*Phytophthora infestans*) [cf. ibid., 31, p. 77] experienced at Rothamsted for many years. Evidence suggested that night temperatures and humidities were important factors in determining spread. Two applications of copper-containing sprays increased tuber yield by 1·5 tons per acre. Against cereal infection by *E. graminis* lime-sulphur exerted a beneficial effect which persisted for a fortnight.

Harris (R. V.). **Plant pathology.**—*Rep. E. Malling Res. Sta., 1950*, pp. 38–41, 1951.

In this report [cf. *R.A.M.*, 30, p. 14] it is stated that further experiments confirmed the importance of leaf spots in the annual cycle of *Pseudomonas morsprunorum* [ibid., 30, p. 618] as a source of inoculum for the winter canker phase on cherry [loc. cit.]. Considerably fewer bacteria were found on the leaves of a resistant variety at leaf fall than on those of a susceptible one. Some connexion was found between leaf spot and the number of dead fruiting spurs. A limited over-wintering survival took place in healthy buds.

Twenty-seven cherry trees showing different suspected virus symptoms were tested in 1949, using clonal rootstock 12/1 as the indicator. In 1950 all but two trees proved to be infected, the viruses being tentatively assigned to the tatter leaf [ibid., 30, pp. 46, 167], rosette, vein-clearing, mottle, rusty mottle, and rasp leaf [loc. cit.] groups. Of 50 orchards inspected none was entirely free from probable virus symptoms.

In the course of experiments on the three groups of strawberry viruses described by Prentice the following facts emerged concerning virus 1 [strawberry mild crinkle virus: ibid., 27, p. 571; 28, p. 342]. Both the mild and severe low-persistence viruses can multiply in the same plant and there is some evidence that the mild virus is more persistent than the severe. A third non-persistent virus of intermediate virulence has been separated. The relationship of these three viruses to Prentice's 1A and 1B has yet to be determined.

Of two new virus diseases of black currants, one causes an olive-green mottling as the leaves age and the other yellow veinbanding and ring spot. The 'giant gooseberry' condition of gooseberries has not been transmitted in grafting experiments, but clearing and banding of the veins was transmitted to 'giant gooseberries' from the Leveller plants to which they were grafted. Observations suggest that this vein-clearing virus causes stunting in commercial plantings.

Härle (A.). **Die wichtigsten Krankheiten und Schädlinge an Kulturpflanzen im Jahre 1949 im Bereich der Bundesrepublik Deutschland.** [The principal diseases and pests on cultivated plants in the year 1949 in the zone of the Federal Republic of Germany.]—*NachrBl. dtsch. PflSchDienst (Braunschw.)*, 3, 7, pp. 101–109, 1951.

This report on the diseases and pests of cultivated plants in Western Germany in 1949 is compiled on the usual lines [cf. *R.A.M.*, 28, p. 562].

Plantesygdomme i Danmark 1949. Årsoversigt samlet ved Statens plantepatologiske Forsøg, Lyngby. [Plant diseases in Denmark in 1949. Annual survey of data collected by the State Phytopathological Service, Lyngby.]—*Tidsskr. Planteavl*, 55, 1, pp. 1–81, 2 figs., 2 graphs, 1951. [English summary.]

The following is some of the information contributed to this report [cf. *R.A.M.*, 30, p. 600], by H. R. Hansen, Anna Weber, H. R. Kristensen, and Gudrun Troelsen-Johansen. *Puccinia graminis* [ibid., 31, p. 109] caused heavy damage on oats in two localities in south Jutland and on wheat in Møen Island; there were no barberries in the vicinity. Severe outbreaks of *P. dispersa* on rye [loc. cit.] were

reported from several parts of the country. *Cercosporella herpotrichoides* was much in evidence on wheat and rye, its virulence on the latter crop being exceptional.

Sclerotinia trifoliorum was destructive to clover [ibid., 29, p. 565], especially in pure stands, and also attacked lucerne, while sweet clover (*Melilotus leucantha*) [*M. alba*: ibid., 27, p. 365] was decimated by the pathogen in May. Trefoil [*Medicago lupulina*] and lucerne were infected by *Ascochyta imperfecta* [ibid., 29, p. 367]. Lucerne also sustained heavy damage from *Pseudopeziza medicaginis* [ibid., 25, p. 203].

Beet yellows virus [ibid., 30, pp. 399, 600] was prevalent and often severe. Black leg (*Pythium*, *Phoma*, and other fungi) [ibid., 29, p. 248] was widespread and much more severe than in 1948, especially in waterlogged soils or those with an unduly low pH or deficient in phosphorus.

Wart disease (*Synchytrium endobioticum*) of potatoes was notified from eight new municipalities.

Rubbery wood and flat limb viruses were reported on the Lord Lambourne and Graasten apple varieties, respectively [ibid., 30, p. 325]. Vine downy mildew (*Peronospora* [*Plasmopara*] *viticola*), ordinarily rare in Denmark, assumed great prominence in certain localities. *Gloeosporium* [*Pseudopeziza*] *ribis* was common on gooseberries and black and red currants [ibid., 12, p. 640], causing premature defoliation.

Allium mosaic virus 1 [onion yellow dwarf virus] is so prevalent on home-grown shallots [ibid., 29, p. 248] that the use of certified planting material is advisable.

Verticillium albo-atrum [ibid., 4, p. 323] and *Didymella lycopersici* [ibid., 5, p. 259] were very widespread on glasshouse tomatoes, especially in sterilized soil.

Marssonina kirchneri [*Phoma anethi*: ibid., 27, p. 400] occurred on dill cultivated for seed.

Peronospora matthiolae was troublesome on stock [*Matthiola* spp.: ibid., 25, p. 579; 26, p. 130]; 0·5 per cent. bouisol [ibid., 24, p. 424; 26, p. 506, *et passim*] gave effective control.

Diseases observed or confirmed in the country for the first time during the year included apricot mosaic; *Daphne* mosaic virus on *D. mezereum* [ibid., 22, p. 390; 23, p. 438] (also reported from Germany); a severe mosaic of *Tagetes patula* due to a virus transmissible by sap inoculation to *Nicotiana glutinosa* and *Datura stramonium*; chocolate spot of daffodil (*Narcissus*) [*pseudo-narcissus*], characterized by irregular, chocolate-brown lesions on the leaves, which has been described from Holland, where it is attributed to a sap-transmissible virus; stock mosaic virus on *M. incana* [ibid., 28, p. 291], especially the red Granat variety, inducing sevère floral colour breaking but no leaf symptoms; *Sclerotium cepivorum* on onions [ibid., 25, pp. 57, 90; 26, p. 477]; and cherry leaf spot (*Higginsia* [*Coccomyces*] *hiemalis*) [C.M.I. map No. 58].

Sarejanni (J. A.), Démétriadès (S. D.), & Zachos (D. G.). **Rapport sommaire sur les maladies des plantes observées en Grèce en 1948 et 1949.** [A brief report on the plant diseases observed in Greece in 1948 and 1949.]—*Ann. Inst. phytopath. Benaki*, 4, 1–2, pp. 5–7, 1950.

During 1948, court-noué [*R.A.M.*, 19, p. 454; 30, pp. 213, 403] was observed for the first time on American vines in the nurseries of the Greek Ministry of Agriculture, Lycovrissi, near Kiphissia; endocellular cordons were present in all diseased plants. Moderately severe attacks by *Helminthosporium oryzae* [*Ophiobolus miyabeanus*: cf. C.M.I. map No. 92] and *Piricularia oryzae* [*R.A.M.*, 27, p. 95] occurred on rice in Peloponnesus. Potatoes in Attica and the island of Euboea developed somewhat severe infection by *Colletotrichum atramentarium* [C.M.I. map No. 190]. Damping-off of pine seedlings in Thrace was caused by *Macrophomina phaseoli* [cf. *R.A.M.*, 24, p. 481]. A *Pythium* sp. caused heavy losses to *Robinia pseudo-acacia*

and *Begonia* seedlings [cf. ibid., 29, p. 414] in Attica. A rather extensive area of strawberries near Florina, eastern Macedonia, was affected by *Mycosphaerella fragariae* [cf. C.M.I. map No. 110].

Department of Agriculture, Kenya, Annual Report 1949. Vol. II.—Record of Investigations.—89 pp., 1951.

In the report of the senior plant pathologist (pp. 9–12) [cf. *R.A.M.*, 30, p. 308] it is stated that chocolate spot of broad beans in Kenya was shown to be caused by *Botrytis cinerea* [cf. ibid., 29, p. 72]. Virus diseases of plum and apple are widespread; plum chlorosis and apple mosaic appear to be identical with the forms of these two diseases present in South Africa [ibid., 4, p. 40; 28, p. 511]. Plums were attacked for the first time by *Cladosporium* [*Fusicladium*] *carpophilum* [C.M.I. map No. 198]. Much loss was caused in two commercial tomato plantations by a disease, apparently of virus origin, with foliage symptoms resembling those of bunchy top [cf. *R.A.M.*, 30, p. 590]. Onions were affected for the first time by *Alternaria porri* [cf. ibid., 24, p. 93] and turnips by *A. brassicae*. In the collections of wheat stem rust [*Puccinia graminis*] received was present what is probably a new physiologic race, No. 9 [cf. ibid., 30, p. 308].

In the annual report of the plant pathologist and physiologist of the Coffee Services (pp. 44–52) comparative spraying experiments against coffee [physiological] leaf fall are described, using copper and non-copper-containing fungicides [cf. ibid., 22, p. 63] applied in April and June. As in 1948, there were two leaf-fall periods, from the third week in August to the third week in November and from the second week in January to the end of March. In 1949 sprays of lime-sulphur, tulisan [ibid., 29, pp. 215, 519], Magadi ash Burgundy, carbide Bordeaux, and copper sulphate watered on the ground gave leaf fall figures of 60·2, 64·6, 65·8, 81·3, and 100·1 per cent., respectively, taking the control as 100. Shedding was effectively reduced throughout the first period and up to the beginning of March in the second. Thus, the second spray would seem to have reduced leaf fall for some nine months after its application. In September leaf spotting was least with the copper sprays, intermediate with the non-copper, and highest with the soil application and the control, while leaf density was highest on the Bordeaux- and Burgundy-sprayed trees and lowest with tulisan and on the unsprayed trees.

Examination of 'weak spots' whose presence suggested fungal invasion showed that crater-like structures were comparatively rare. Usually a swelling occurred on the lower surface of the coffee leaf, sometimes accompaniedby a slight protuberance on the upper. The underlying mesophyll consisted of polygonal cells closely packed together without air spaces, but separating into a mealy mass upon removal of the epidermis. No mycelium was found in mesophyll and epidermis from the spot, but mycelium was clearly present in the centre of the spot, penetrating to the palisade tissue. The whole picture was one of strong resistance by the host completely localizing the attack. Further evidence confirmed the superficiality in these spots of *Colletotrichum* [*coffeanum*: *Glomerella cingulata*] and *Phoma* infections [cf. ibid., 27, p. 280]. Further work is in progress.

Department of Agriculture, Uganda, Record of Investigations No. 1, for the period 1st April, 1948 to 31st March, 1949.—91 pp., 9 graphs, 1950.

In the section of this report (replacing Part II of the Uganda Annual Report [cf. *R.A.M.*, 30, p. 140], now discontinued) dealing with the cotton crop in Uganda (pp. 1–10) [also published in Progress Reports from Experiments Stations: see above, p. 184], J. D. Jameson states that when rainfall in the first quarter of the year is above the average, incidence of blackarm (*Xanthomonas malvacearum* [loc. cit.]) is greatly reduced. Furthermore, the disease is least severe in areas with 3 in. rain or more in February [cf. ibid., 27, p. 183]. Incidence increases considerably

where rainfall in the third quarter of the year is above the average, while the disease is also most severe in localities with 5 in. or more in August. The author's view is that a close season, wet from the start, favours rotting of the infected debris shed from the previous crop [cf. ibid., 28, p. 171]. In most years, however, the close season may be dry enough to allow an appreciable carry-over of infected material, and when it is large secondary spread produces an epidemic in almost any weather; when it is slight, August rainfall is the factor determining whether secondary spread will reach epidemic proportions or not. It is also possible that when January opens with an unusual amount of rain and the seed is ginned and stored rather damp, seed-borne infection does not persist so long.

The whole cotton programme at Serere has been revised to investigate means of reducing blackarm. With the assistance of Imperial Chemical Industries, Ltd., an attempt is to be made to eliminate or materially reduce by physical and chemical methods the carry-over of the disease in the seed and debris. As the first rains are frequently delayed an extension of the end of the close season would be valuable, and the breeding programme is therefore directed towards the selection of rapidly maturing varieties which would make the earliest plantings unnecessary.

The new programme of breeding for resistance [cf. ibid., 30, p. 157] will include seed inoculation, because the perfection of the main-stem lesion criterion [loc. cit.] requires that all seed planted shall be of equal status and heavily infected. While B_2 (and later, perhaps, other genes) will be adopted as a minimum standard of resistance, a return will also be made to this modified method based on the stem lesion. It will also pay attention to the boll lesions.

STARR (M. P.) & MANDEL (M.). **The nutrition of phytopathogenic bacteria. IV. Minimal nutritive requirements of the genus Erwinia.**—*J. Bact.*, 60, 5, pp. 669–672, 1950. [Received February, 1952.]

In further studies on phytopathogenic bacteria at the University of California [*R.A.M.*, 28, pp. 56, 381] the authors examined 54 cultures and determined the minimal nutritive requirements of 16 species and varieties of *Erwinia* [ibid., 30, p. 145; 31, p. 9]. All 38 cultures of the soft rot group (*E. ananas*, *E. aroideae*, *E. atroseptica* [*E. carotovora*], *E. carotovora*, its var. *delphinii* and f.sp. *parthenii*, *E. carnegieana*, *E. mangiferae*, *E. nimipressuralis* [ibid., 31, p. 39], *E. oleraceae*, *E. phytophthora* [*E. carotovora*], and *E. rhapontici*) grew through serial transfers in the basal medium (glucose, salts, and ammonium chloride) without supplement, generally more slowly than in non-synthetic media, though the final yield was approximately the same. The addition of amino acids in various forms increased the growth rate of the more slowly growing, non-exacting cultures, indicating that the limiting disability is concerned with amino acid synthesis. All the organisms in this group were unaffected by a vitamin supplement.

Not one of 12 strains of *E. amylovora*, whatever its origin or duration of culture in the laboratory (up to 12 years), grew in the basal medium under the experimental conditions. All required vitamin supplement, the essential requirement later being identified as nicotinic acid. Approximately 10 μgm. per 100 ml. of medium allowed full growth of static cultures.

The one culture of *E. cassavae* and the one of *E. salicis* [ibid., 29, p. 542] studied were non-exacting, and grew better in a casein hydrolyzate medium than in the basal medium, partly because the pH falls to a limiting value more rapidly in the unsupplemented basal medium. Of two cultures of *E. tracheiphila*, one (Dowson ET1) was non-exacting but grew better with casein hydrolyzate, while the other (A.C.T.C. 101) obligately required nicotinic acid and thiamine.

In view of these results, the statement in Bergey's 'Manual of Determinative Bacteriology' [ibid., 28, p. 512] that the genus *Erwinia* 'normally requires organic nitrogen compounds for growth' does not appear to be correct. The specific require-

ment of *E. amylovora* for nicotinic acid will probably prove of assistance in the isolation and identification of this organism.

There is much similarity in nutritional requirements between *Erwinia* and the other members of the Enterobacteriaceae. This supports Dowson's contention [ibid., 18, p. 658; 29, p. 252] that the generic names of most of Bergey's Enterobacteriaceae should be discarded and that these forms, including the peritrichous phytopathogens, should be put into a single genus such as *Bacterium*.

Repert (A.-F.) & Havas (L.-J.). **Essai de traitement des phytocarcinomes par l'abiotique pénitaline.** [An experiment on the treatment of plant galls with the abiotic penitalin.]—*Rev. Path. vég.*, 30, 1, pp. 25–29, 3 figs., 1 graph, 1951.

Experiments carried out at the Analytical Medical Laboratory, Guebwiller (Haut-Rhin), demonstrated the selective inhibitory action of penitalin (an extract from a culture of a selected strain of *Penicillium italicum*) towards the development of artificially induced galls of *Phytomonas* [*Bacterium*] *tumefaciens* on *Pelargonium zonale* [*R.A.M.*, 28, p. 118; 30, p. 217], although growth was resumed following the cessation of treatment [cf. ibid., 29, p. 146].

Tsuyama (H.) & Sakamoto (M.). **Studies on the soil-borne, phytopathogenic bacteria. Part I. A seasonal variation of the soft-rot-causing bacteria in the soil.**—*Bull. Inst. agric. Res. Tohoku Univ.*, 3, pp. 13–22, 1951. [Japanese, with English summary.]

The seasonal trend in the number of bacteria causing soft rot of vegetables in field soil was investigated on a farm at Tohoku, Japan, where potato and Chinese cabbage (*Brassica pekinensis*) had been raised alternately for many years. The number of causal organisms in the soil was estimated by means of the development of rot in sterile carrot slices inoculated with an agar plate culture containing an aliquot volume of properly diluted soil solution. The number of bacteria was highest in June and then rapidly decreased. In late September, when the characteristic lesions began to appear on the basal leaves of Chinese cabbage, incidence suddenly increased and reached a new peak in January. A decline followed and persisted during March and April.

Blanchard (F. A.). **Aureomycin chemotherapy of crown gall in Tomatoes.**—*Phytopathology*, 41, 11, pp. 955–958, 1 fig., 1951.

At the University of Cincinnati, Ohio, fewer and smaller galls developed on Bonny Best tomato plants grown in a solution of aureomycin hydrochloride in a mineral nutrient solution following inoculation with *Agrobacterium* [*Bacterium*] *tumefaciens* [*R.A.M.*, 29, p. 146] than on those in the nutrient solution alone. A slight reduction in the incidence and extent of gall production was effected by concentrations of 5 and 10 μgm. of the antibiotic, while at 20 μgm. control was virtually complete. At dosages of 50 μgm. and upwards aureomycin caused severe wilting, stunting, and death of the plants.

Braun (A. C.). **Cellular autonomy in crown gall.** –*Phytopathology*, 41, 11, pp. 963–966, 3 figs., 1951.

At the Rockefeller Institute for Medical Research, New York, using methods described in connexion with previous studies [*R.A.M.*, 23, p. 128], the author inoculated large, woody *Vinca major* plants at several hundred points with a peach strain of crown gall [*Bacterium tumefaciens*]. After some time in a greenhouse at 25° C. the host-parasite complex was subjected to four days' thermal treatment at 46° to 47° and then again transferred to the greenhouse for periods up to eight months.

Numerous isolations from representative material at varying periods after inoculation demonstrated that all viable bacteria had been eliminated from the host by the third day of the thermal treatment [ibid., 30, p. 406]. When they were allowed to act on the host cells for four days at 25° before elimination, the resultant overgrowths developed rapidly into large neoplasms, whereas the excrescences formed at some points of inoculation when bacterial activity was terminated after 34 hours were very small. Some of the latter type, however, continued to develop very slowly and after eight months reached moderate dimensions.

Fragments isolated from five of the slow-growing tumours developed more slowly on White's culture medium [ibid., 24, p. 407] than did comparable material from cells transformed by the bacteria during a four-day period of operation. Two clones of each type of tissue maintained in culture for nearly five years retained their characteristic growth habits throughout that period, but instances of spontaneous mutation from slow to fast growth have been observed *in vitro*.

It is evident from these results that both the slow- and fast-growing tumours of *V. major* are capable of autonomous development. It is suggested that the high growth rate is a property acquired by degrees during the four-day period requisite for the complete transformation of normal into tumorous cells.

HASSEBRAUK (K.). **Untersuchungen über die Einwirkung von Sulfonamiden und Sulfonen auf Getreideroste. I. Die Beeinflussung des Fruktifikationsvermögens.** [Studies on the effect of sulphonamides and sulphones on cereal rusts. I. Influence on the capacity for fructification.]—*Phytopath. Z.*, 17, 4, pp. 384–400, 1951.

In continuation of previous experiments directed towards the control of cereal rusts (*Puccinia* spp.) at the Brunswick branch of the Biological Institute [*R.A.M.*, 19, p. 364], a number of sulphonamides and sulphones used in human or veterinary medicine were tested for this purpose on seedling plants in the greenhouse in 1950.

Infection by *P. triticina* on the highly susceptible Michigan Amber wheat variety was completely inhibited by absorption through the roots of chemodyn or prontalbin (*p*-aminobenzolsulphonamide) strewn over the soil at the rate of 100 mg. per 100 sq. cm., albucid (acetylsulphanilamide) at the same dosage, marbadal (marfanil salt of badional, i.e., 4-aminomethylbenzolsulphonamide of 4-aminobenzolsulphothiocarbamide) at 1,250 mg., saccharin at 250, debenal (2-*p*-aminobenzolsulphonamide-pyrimidin) at 250, and its methylated derivatives, methylpyrimal, methyldebenal, and sodium methyldebenal at 50, aristamide (6-sulphanilamido-2, 4-dimethyl pyrimidin) at 250, ladogal (sodium salt of *p*-aminobenzolsulphonoxymethylamide-N^4-*d*-glucoside sulphonic acid) at 1,250, and baludon (4,4-diaminodiphenylsulphone-diacetaldehyde sodium bisulphite) at the same dosage. Secondary phytotoxic effects were fairly marked following the application of the first three compounds in appreciable amounts, conspicuous when saccharin was used, and slight with debenal, ladogal, and baludon. Total suppression of *P. triticina* was also effected by suspension of the inoculated leaves for five nights in 0·5 per mille solutions of chemodyn, aristamide, and ladogal.

In general, the effects of the chemicals in the fewer tests on Fong Tien barley infected by *P. simplex* [*P. hordei*: ibid., 28, p. 133], Flämings Goldhafer oats (*P. coronata*), and Petkus winter rye (*P. dispersa*) were fundamentally similar to those described in connexion with *P. triticina*, with occasional more or less pronounced deviations. Rye leaves treated once or twice with methylated debenal bore, in addition to the normal dark brown pustules, pale yellow, non-infective uredosori.

For the moment no conclusions can be drawn as to the practical applicability of the sulphonamides and sulphones in cereal rust control.

Hyde (M[olly] B.) & Galleymore (H. B.). **The subepidermal fungi of cereal grains. II. The nature, identity and origin of the mycelium in Wheat.**—*Ann. appl. Biol.*, 38, 2, pp. 348–356, 1 pl., 2 graphs, 1951.

Further studies at the Pest Infestation Laboratory, Slough, on the extracellular, septate mycelium present in normal wheat grains [*R.A.M.*, 29, p. 611] showed that it usually lies between the epidermis and the cross-layer cells, forming a network on the inner surface of the epidermis, the cells of which are occasionally penetrated [cf. ibid., 22, p. 395]. It is first present at a somewhat late stage of maturation, when the grain has reached maximum size and weight and has begun to dry. As a rule it remains as a loose network, though sclerotia and plate-like structures suggestive of drought forms are sometimes present. Spread would appear to be restricted finally by desiccation during the drying of the ripening grain.

Cultures from Bersée wheat showed that the fungus most commonly present was *Alternaria tenuis* [cf. ibid., 30, p. 102; 31, pp. 55, 112], found in 64·4 per cent. of grains examined. Other organisms isolated were bacteria (28·8 per cent.), (?) *Mycogone* sp. (7·7), *Cladosporium herbarum* (5·8), *Pullularia pullulans* (4·8), *Fusarium* sp. (1·9), *Botrytis cinerea* (1·9), and *Stemphylium botryosum* [*Pleospora herbarum*] (0·9). Platings from surface-sterilized stem sections of the basal internode and the part immediately below the inflorescence showed that most of the fungi detected in the grain are also present in the stems and in about the same relative proportions. It is suggested that the mycelium may arise from a systemic infection or from fungal spores and hyphae present on the outside of the developing grains and among the dead floral parts.

Tomiyama (H.). **Pathogenicity of two sclerotial snow blight fungi.**—*Agric. & Hort., Tokyo*, 26, pp. 1105–1106, 1951. [Japanese.]

In Hokkaido, Japan, there are two species of the sclerotial snow blight fungi, *Typhula itoana* [*R.A.M.*, 31, p. 57] and *T. ishikariensis*, which cause most of the damage on wheat in the Sapporo district. The results of inoculation experiments showed that *T. itoana* can invade only old leaves of wheat, barley, and rye, while *T. ishikariensis* is intensely pathogenic to the young foliage. The difference in pathogenicity between these two fungi was not modified by the use of diverse strains or the cultural conditions employed. In the field, too, heavily infected areas or plants harboured *T. ishikariensis* and those slightly diseased *T. itoana*. The latter species is more widely distributed in nature than the former.

McKinney (H. H.) & Fellows (H.). **Wild and forage grasses found to be susceptible to the Wheat streak-mosaic virus.**—*Plant Dis. Reptr*, 35, 10, pp. 441–442, 1951. [Multilithed.]

Among the grasses found susceptible to wheat yellow streak-mosaic virus [? strain of wheat mosaic virus: *R.A.M.*, 29, p. 94; 31, p. 12] in greenhouse tests at Arlington Farms, Virginia, and at Beltsville, Maryland, are five species of *Aegilops*, *Bromus japonicus*, *Digitaria ischaemum*, four species of *Elymus* with mosaic or local lesions, three species of *Hordeum*, and *Eragrostis trichodes*.

Leukel (R. W.). **Cooperative seed-treatment tests on small grains in 1951.**—*Plant Dis. Reptr*, 35, 10, pp. 445–451, 1951. [Multilithed.]

In the 1951 co-operative seed treatment tests [cf. *R.A.M.*, 29, p. 95; 30, p. 223 and next abstract] carried out at nine experiment stations in the United States, 18 fungicides were tested at seven stations for the control of bunt [*Tilletia caries* and *T. foetida*] in Ulka wheat using artificially infected seed. The average infection for all stations was reduced to 1 per cent. or less by aagrano slurry (at ½ oz. per bush.) [ibid., 30, p. 516], diluted panogen (¾), ceresan M slurry (½), mercuran

A.L. (½), concentrated panogen (¾), and an experimental 10 per cent. ethyl mercury perthiocyanate dust, K.F. 467 [Koppers Company, Pittsburgh, Pennsylvania] (½.) At several stations where infection in the controls was high, ceresan M dust (½ oz.), copper carbonate (2), spergon (1), aagrano dust (½), phygon (1), CC 640 (zinc copper chromate, 1), and anticarie (½) proved fairly effective. Nine fungicides tested at three stations for the control of stripe [*Helminthosporium gramineum*] in Atlas barley, and at all the stations against smuts [*U. avenae* and *U. kolleri*] in Canadian oats, reduced stripe incidence to less than 1 per cent., ceresan M dust (½ oz.), aagrano (½), agrox (6·7 per cent. phenyl mercury urea dust, ½), K.F. 467 (½), mercuran A.S. dust (½), ceresan M slurry (½), concentrated panogen (¾), and diluted (¾) all eliminated the disease entirely. Ceresan M (½), aagrano (dust and slurry, ½), and diluted panogen (¾) reduced the average percentage of oat smuts to a trace, and concentrated panogen (¾) gave complete control. None of the treatments had any appreciable effect on seed germination.

Leukel (R. W.). **Cereal seed-treatment results (additions and corrections.)**—*Plant Dis. Reptr*, 35, 11, pp. 485–486, 1951. [Multilithed.]

In M. B. Moore's report from University Farm, St. Paul, Minnesota, effective treatments, in addition to those already listed [see preceding abstract], included dynacide dust (½ oz. per bush.) and mercuran A.S. dust (½) for the control of smuts [*Ustilago avenae* and *U. kolleri*] in Canadian oats. In C. S. Holton's experiments on control of bunt [*Tilletia caries* and *T. foetida*] in winter wheat at Pullman, Washington, in 1950–1 agrox slurry (½), F.W.P.F.C. dust (composition not given, ½), and mergamma (dust and slurry, ½) eliminated the disease entirely.

Holton (C. S.) & Jackson (T. L.). **Varietal reaction to dwarf bunt and flag smut, and the occurrence of both in the same Wheat plant.**—*Phytopathology*, 41, 11, pp. 1035–1037, 1 fig., 1951.

Dwarf bunt (*Tilletia caries*) [*R.A.M.*, 31, p. 58] and flag smut (*Urocystis tritici*) [ibid., 29, p. 544] have occurred simultaneously in winter wheat crops in Klickitat County, Washington, since 1940. Surveys beginning in that year have disclosed the presence of the latter disease in about half the fields in the infested area, covering 100 square miles, the incidence of infection ranging from a trace to 10 per cent. with an occasional patch of 25 per cent. Dwarf bunt, though equally persistent during the period under review, was less severe until 1950, when intensive outbreaks of both diseases developed in at least two fields, in one of which, planted with Hybrid 143, 20 per cent. of the heads harboured *T. caries* and 15 per cent. *U. tritici*. In a winter wheat yield nursery comprising 14 varieties sown in randomized rod-rows with five replications, only Rex was resistant to both pathogens (trace of infection). Resistance to dwarf bunt was also shown by Hymar, Orfed × Hybrid 1–3, and Orfed × Hybrid 1–6, and to flag smut by Golden and Rio. The field resistance of Rex to *U. tritici* is noteworthy in view of its marked susceptibility in the greenhouse (52 and 63 per cent. in two tests).

Both diseases proceed from the soil and are best controlled by the cultivation of resistant varieties, of which Rex appears to be only one immediately available for this purpose. More may be developed, however, by combining the resistance of Golden to flag smut with that of others to dwarf bunt. In several varieties, e.g., Orfed × Elgin-1, the same plant harboured both fungi. Infection by *U. tritici* usually suppressed heading but mixed infection frequently resulted in the production of bunted spikes.

Tinline (R. D.). **Studies on the perfect stage of Helminthosporium sativum.**—*Canad. J. Bot.*, 29, 5, pp. 467–478, 2 pl., 3 diags., 1951.

This is a full account of studies at the Dominion Laboratory of Plant Pathology,

University of Saskatchewan, Saskatoon, on *Cochliobolus sativus*, the perfect state of *Helminthosporium sativum* [*R.A.M.*, 31, p. 50], a description of which is given. The most satisfactory medium for perithecial production consisted of boiled, surface-sterilized barley kernels on Sach's nutrient agar. Cultural studies of single ascospore isolates showed that the fungus is heterothallic in so far as it is hermaphroditic, self-sterile, intra-group sterile, and inter-group fertile. The two compatibility groups in *C. sativus* were distributed at random in nature; isolates from any one area falling into either group.

Hsia (Y.-T.) & Christensen (J. J.). **Effect of 2,4-D on seedling blight of Wheat caused by Helminthosporium sativum.**—*Phytopathology*, 41, 11, pp. 1011–1020, 3 figs., 1951.

At the Minnesota Agricultural Experiment Station the pathogenicity of *Helminthosporium sativum* on Mida wheat was enhanced by the addition to the culture medium of 2,4-D [cf. *R.A.M.*, 28, p. 278; 30, p. 239], which appears from the available evidence to act rather by predisposing the host to infection than by increasing the virulence of the fungus. The treatment of wheat plants with 2,4-D resulted in weakening, hypertrophy, stunting, and intensified susceptibility to artificial infection with *H. sativum*. The effect of the hormone on the growth of the organism in pure culture was generally inhibitory, becoming progressively more pronounced with rises in the concentration from 100 to 10,000 p.p.m., though a few cases of stimulation were observed.

Genetic variation, expressed by the development of sectors in the colony [ibid., 12, pp. 560, 755], occurred in *H. sativum* on a medium supplemented by 2,4-D. It was more frequent on the ammonium and sodium salts than on the amine and ethyl ester formulations and varied with the concentration and with physiologic races of the fungus (1 and 2) used in the experiments. None of the mutants proved to be more pathogenic than the parent [cf. ibid., 20, p. 107; 26, p. 98].

Ibrahim (I. A.). **Effect of 2,4-D on stem-rust development in Oats.**—*Phytopathology*, 41, 11, pp. 951–953, 1951.

Studies on the effect of 2,4-D on the development of physiologic races 6 and 8 of *Puccinia graminis avenae* on oats [*R.A.M.*, 19, p. 399; 26, p. 385; 28, p. 440; 30, p. 314, and cf. next abstract] are described from the Minnesota Agricultural Experiment Station. Plants of the susceptible Bond variety sprayed with the herbicide at 1,000 p.p.m. bore uniformly fewer uredosori than the untreated, the minimum of 49 per 45 plants (representing 5 per cent. infection), as against 887 (100) in the control plot, resulting from an application two days before inoculation. The corresponding figures for another two-day treatment, one three days, and two four days before inoculation were, respectively, 175 (19), 167 (18), 172 (19), and 112 (13). The characteristic reactions of five varieties of oats to stem rust races were not materially altered by spraying with 2,4-D at 1,000 p.p.m. Solutions of the chemical up to 50 p.p.m. permitted normal uredospore germination but not those of higher concentration.

Peturson (B.). **Effect of growth-promoting substances on the germination of urediospores of crown rust.**—*Phytopathology*, 41, 11, pp. 1039–1040, 1951.

At the University of Minnesota, St. Paul, uredospores of races 4 and 34 of crown rust of oats (*Puccinia coronata*) [*R.A.M.*, 30, p. 606] showed only a trace of germination in solutions of 3-indole-acetic acid at 400 p.p.m. and only 1 per cent. and a trace germination, respectively, in 2,4-D at a concentration of 10,000 p.p.m. [cf. preceding abstract]. The germination percentages of races 4 and 34 in 3 indole-acetic acid at 330, 220, 200, 135, 100, and 65 p.p.m. were a trace and 25,

15 and 70, 72 and 95, 78 and 85, 79 and 95, and 80 and 95, respectively, compared with 80 and 93, respectively, in distilled water, while the corresponding figures for the two races in 2,4-D were 1 and a trace, respectively, at 7,000, 15 and 45 at 5,000, 25 and 35 at 4,000, 30 and 70 at 3,000, 85 and 60 at 2,000, 85 and 90 at both 200 and 135, and 84 and 90 at 100 p.p.m., as against 86 and 90 in distilled water.

It is apparent from these results that crown rust spores are relatively insensitive to 2,4-D, and their germination would probably not be affected by concentrations of the hormone appropriate to weed control in cereal crops.

COFFMAN (F. A.), STEVENS (H.), & HOLTON (C. S.). **Overland and Cody, two new short-strawed Oats for the Northwest.**—*Agron. J.*, 43, 7, pp. 325–328, 1951.

The new varieties of oats, Overland and Cody (C.I. Nos. 4181 and 3916), are highly resistant to the 15 physiologic races of loose smut (*Ustilago avenae*), the seven of covered smut (*U. kolleri*), and the common races of crown and stem rusts [*Puccinia coronata* and *P. graminis*: *R.A.M.*, 30, p. 225] encountered in the northern Rocky Mountain and north Pacific States of the American Union. Both varieties are very susceptible to Victoria blight [*Helminthosporium victoriae*: loc. cit.], which has not yet, however, assumed a serious character in the north-west. The performance of Overland and Cody has been so remarkable that their release is considered to be fully justified.

GOTO (K.) & NAKANISHI (I.). **Ear burn, a new bacterial disease of Barley.**—*Ann. phytopath. Soc. Japan*, 15, pp. 117–120, 1951. [Japanese, with English summary.]

A new disease of barley in Japan, termed ear burn, appears at the upper part of a culm and the ear, the latter turning completely light brown prematurely. From the base of the ear a dark brown line usually runs down the culm into the flag-leaf sheath. The causal organism of the disease is regarded as new to science and is named *Aplanobacter hordei*. From inoculation tests it is concluded that the organism is moderately pathogenic to wheat, very slightly to oats, and not at all to maize.

CUNNINGHAM (J. C.). **Maize bibliography for the years 1937 to 1945, inclusive.**—*Contr. Iowa Corn Res. Inst.*, 3, 3, pp. 194–298, 1951.

With the publication of this section of the present bibliography a project started in 1935 under the auspices of the Iowa Agricultural Experiment Station has been completed for the period 1888 to 1945. The first section covered the years 1917 to 1936, and the second 1888 to 1916 [*R.A.M.*, 28, p. 390]. The work is arranged alphabetically by subject, under the popular rather than the scientific name, and there is an author index. The section on diseases other than those due to animal pests comprises 135 entries.

SCOSSIROLI (R.). **Influenza del 'nanismo epidemico' del Mais sulla composizione chimica delle cariossidi e considerazioni sulla natura della malattia.** [Influence of 'epidemic dwarfing' of Maize on the chemical composition of the kernels and considerations on the nature of the disease.]—*Notiz. Malatt. Piante, 1951*, 15, pp. 9–13, 1951. [English summary, p. 99].

An examination of the chemical composition of kernels from the hybrid dent maize varieties Iowa 4297 and 4316 and the flint open pollinated varieties Nostrano dell' Isola and Scagliolo 23A affected by epidemic dwarfing at Curno, Bergamo, Italy, in 1949 [*R.A.M.*, 31, p. 13] revealed an increase in the percentage of total nitrogen in the dry matter and a reduction in total sugars and 'rough' fats as the height of the plant is reduced, compared with healthy plants. These results are considered to confirm the presence of a virus [ibid., 29, p. 463], probably of a mosaic

type. An analysis of the regression lines for the percentages of total sugars and nitrogen for both hybrid and 'OP' varieties showed good agreement. Both types were affected equally by the disease.

Leukel (R. W.). **Sorghum seed treatment studies in 1951.**—*Plant Dis. Reptr*, 35, 10, pp. 451–452, 1951. [Multilithed.]

In the 1951 sorghum seed treatment tests [cf. *R.A.M.*, 30, p. 317] emergence of Sharon kafir, inoculated with covered smut [*Sphacelotheca sorghi*: loc. cit.] at the Plant Industry Station, Beltsville, Maryland, was visibly improved by most of the 18 fungicides used, of which CC 5400 at 2 oz. per bush. [loc. cit.], CC 640 (2 oz.), copper carbonate (2), phygon (2), dynacide (1), ceresan M ($\frac{1}{2}$), agrox ($\frac{1}{2}$) [see above, p. 178], L-224 (a zinc mercury chromate dust produced by Carbide and Carbon Chemicals, $\frac{1}{2}$ oz.), K.F. 467 ($\frac{1}{2}$) [loc. cit.], panogen ($\frac{3}{4}$), P.M.A.S. ($\frac{1}{2}$) [ibid., 28, p. 294], mercusol (2 per cent. phenyl mercuric salicylate liquid, H. L. Woodhuysen, 1 oz.), and vancide 51 (30 per cent. sodium salts of dimethyldithiocarbamic acid and 2-mercapto-benzothiazole, Vanderbilt, New York, 4 oz.) gave complete control. Arasan (2 oz.) allowed 0·3 per cent. smutted heads; N.P. 679 (50 per cent. substituted aromatic fluoride dust, Pennsylvania Salt Manufacturing Company, 2 oz.), 275-D (50 per cent. pentachloronitrobenzene dust, Mathieson Chemical Corporation, 2 oz.), and mercuran A.L. ($\frac{1}{2}$) all 0·6 per cent., compared with 55 per cent. in the untreated.

Suit (R. F.). **Parasitic diseases of Citrus in Florida.**—*Bull. Fla agric. Exp. Sta.* 463, 112 pp., 55 figs., 1949. [Received November, 1951.]

This is a condensed revision of *Bull. Fla agric. Exp. Sta.* 229 [*R.A.M.*, 11, p. 364], in which the symptoms, cause, and control of the various parasitic diseases of citrus in Florida are described.

Condado (C.). **'Xyloporosis' en Bella Vista, Corrientes.** [Xyloporosis in Bella Vista, Corrientes.]—*Inform. Direcc. Invest. agríc., B. Aires*, 3, 33–34, pp. 47–50, 3 figs., 1950.

The available information on the history, distribution, symptomatology, etiology, effects on different varieties, and control of citrus xyloporosis [*R.A.M.*, 29, p. 412] is summarized, with special reference to its occurrence in Argentina, where it was first detected in 1938 by H. Speroni on Valencia Late sweet orange grafted on sweet or Persian lime (*Citrus aurantiifolia*) in the province of Corrientes and has since been observed also in Entre Ríos. The cause of the disease is still obscure, the various fungi disclosed by the rupture of the cortex being evidently unconnected with the pathological condition of the trees. In 1947 and 1949 the author also noted xyloporosis on late sweet orange varieties, including Sanguinea Rubí, Bahía, Lue-Gim-Gong, Pera, Parson Brown, Mediterraneo, Azores, and Navelencia, grafted on sweet lime rootstocks, a matter of considerable importance in view of the widespread use of the latter on account of their resistance to tristeza root rot [see next abstracts]. The same varieties, grafted on Rangpur mandarin or sweet orange, remained healthy. Among the cultural practices which are being tested on an estate in Bella Vista, Corrientes, for the control of the disease the use of a complete fertilizer has given the most encouraging results.

Fernandez Valiela (M. V.). **Tristeza o podredumbre de los raicillas de los Citrus en la República Argentina.** [Tristeza or rootlet rot of Citrus in the Argentine Republic.]—*Publ. tec. Centr. Invest. agríc., Reg. Pampeana*, 1, 63 figs., 2 maps, 1951. [English summary.]

This is an extensively amplified version of the author's study on tristeza or root

rot of citrus, responsible for the death of more than 10,000,000 citrus trees in Argentina since 1931 [see preceding and next abstracts], a preliminary note on which has already appeared [*R.A.M.*, 30, p. 266]. Important contributions to the literature on the subject are summarized and a full account is given of the author's experiments, leading to the conclusion that a virus is responsible for the disease and that the only way to control it is to use resistant stocks, such as sweet orange, Rangpur lime, Cleopatra mandarin, rough lemon, and trifoliate orange [ibid., 31, p. 62]. It appears that a substance lethal to the bitter orange stock, which is elaborated by sweet orange, mandarin, and grapefruit leaves in the presence of the virus, is also concerned in the development of infection, since the removal of the scion containing the toxin resulted in the production of normal plants even by stocks containing the virus.

Ducharme (F. P.), Knorr (L. C.), & Banfi (A.). **La presencia del 'stem pitting' en la Argentina.** [The presence of 'stem-pitting' in Argentina.]—*Inform. Direcc. Invest. agríc., B. Aires*, 4, 37–39, pp. 15–20, 3 figs., 1951.

A short introductory note on stem-pitting of citrus [*R.A.M.*, 31, p. 62] is followed by observations on its symptomatology, effects on different varieties, economic importance, and etiology in connexion with the recent discovery of a disease with identical symptoms in the provinces of Entre Ríos, Corrientes, and Misiones, Argentina. The Marsh Seedling grapefruit is chiefly affected, but the Improved mandarin, rough lemon, Nagami kumquat, and Eustis limequat may also be attacked. An inspection of 10 estates planted with Marsh Seedling grapefruit grafted on rough lemon and two with Improved mandarin on sweet orange revealed internal symptoms in 39 to 93 per cent. of the trees. So far there has been no substantial reduction in the grapefruit yield as a result of stem-pitting, judging by data covering the period from 1946 to 1950 on 22-year-old trees on four estates growing Marsh Seedling on rough lemon. Evidence for the authors' belief that stem-pitting is identical with 'tristeza' [loc. cit. and preceding abstracts] is presented and briefly discussed. Whether or not distinct viruses are involved, from the commercial standpoint the two diseases, which in Argentina are uniformly associated, may be regarded as one.

Cárdenas (M.) & Jenkins (Anna E.). **Record of Elsinoë australis in Bolivia.**—*Plant Dis. Reptr*, 35, 10, p. 461, 1951. [Multilithed.]

Sweet orange fruit scab (*Elsinoe australis*) [C.M.I. map No. 55; *R.A.M.*, 30, p. 434] is recorded for the first time in Bolivia from the orange-growing districts of Santa Cruz.

Chowdhury (S.). **'Felt' disease of Citrus in Assam.**—*Sci. & Cult.*, 17, pp. 264–265, 1 fig., 1951.

'Felt' disease (*Septobasidium pseudopedicellatum*) [cf. *R.A.M.*, 28, pp. 271, 365] is common and widespread on citrus in Assam, having been found in all the citrus-growing areas of the State. It attacks Khasi orange (*Citrus reticulata*), Robab Tenga (*C. grandis*) [*C. maxima*], Ada Jamir (*C. assamensis*), Assam lemon, and grapefruit. The light brown to grey, felty layer on the twigs and branches, sometimes extending along the leaf stalks, fragments in winter and pieces of it fall away but it reappears in a more serious form the following June when the rains begin. Scale insects (*Aonidiella aurantii* and *Lepidosaphes* sp.) [cf. ibid., 31, p. 8] were found under the felt. This disease has not before been reported from any citrus-growing region of India. Control consists in good cultural methods and insecticidal spraying.

Chowdhury (S.). **Gummosis of Citrus in Assam.**—*Sci. & Cult.*, 16, pp. 570–571, 1 fig., 1951.

Citrus gummosis, previously reported from India only in Bombay [*R.A.M.*, 5, p. 593; 15, p. 795], is common and widespread in Assam. Isolations from infected material yielded *Phytophthora parasitica* [cf. ibid., 27, p. 319; 28, p. 62] and occasionally *Fusarium lateritium* [cf. ibid., 19, pp. 402, 700]. Inoculation experiments demonstrated the pathogenicity only of the former alone; the severity of the disease was, however, increased if both fungi were used together [cf. ibid., 13, p. 631; 14, p. 505]. Khasi orange (*Citrus reticulata*) and Karun Jamir (*C. aurantium*) appear to be unaffected in Assam. Further investigations are in progress.

Scaramuzzi (G.). **Segnalazione della 'piticchia batterica' del Limone in Liguria.** [Report of 'bacterial pit' of Lemons in Liguria.]—*Notiz. Malatt. Piante, 1951*, 15, pp. 46–49, 1951. [English summary, p. 101.]

During March, 1950, lemons bearing leather-brown blemishes of various shapes and sizes were received from a few gardens near Lerici (La Spezia). The disorder had been observed since the previous year in various citrus groves in the Levante Riviera area of Liguria; in some cases up to 80 per cent. of the fruit was rendered unsaleable. Varieties of lemon and citron were chiefly affected. Sweet orange suffered only slightly and bitter orange not at all. The damage followed a slight hailstorm. The casual organism was identified as *Bacterium* [*Pseudomonas*] *syringae* [*R.A.M.*, 19, p. 274; 25, p. 539; 31, p. 63].

De Carvalho (T.). **O 'cancro dos Citrinos' na Beira.** [Citrus canker in Beira.]—*Gaz. Agric., Moçambique*, 3, 26, pp. 170–176, 2 figs., 2 maps, 1951.

Citrus canker (*Xanthomonas citri*) [C.M.I. map No. 11] was first detected in the Beira region of Mozambique in 1933, although it had probably been present in the country for 40 years. The serious economic and phytopathological problems arising from the discovery were met by the application of a rigorous quarantine and the institution of a drastic eradication campaign. As a result of these measures the disease was considered in 1948 to have been definitely eliminated from the territory, the cost of the campaign amounting to 150.000$00.

Trumple (H. P. C.). **Zinc oxide and Citrus leaf drop.**—*J. Dep. Agric. S. Aust.*, 55, 4, pp. 214–216, 4 figs., 1951.

The results of the two trials carried out in South Australia in August and September, 1950, with two types of zinc oxide, (A) non-chalking with no hydrogen peroxide activity and (B) chalking with hydrogen peroxide activity, used at the rate of 3 lb. per 100 gals. showed B to be responsible for leaf drop of citrus trees [*R.A.M.*, 30, p. 269]. The difference between B-sprayed and unsprayed trees was highly significant in the first trial (37·27 per cent. leaf drop compared with 24·16 for the unsprayed) and quite significant in the second (36·35 and 28·32). Investigations are now in progress to determine whether the hydrogen peroxide activity, chalking, or fluorescence of the zinc oxide is the factor connected with leaf drop. A further season's test is considered essential before any pronouncement upon the safety of a preparation can be made.

Wellman (F. L.). **Control del 'ojo de gallo', Omphalia flavida, por medio de las deshoja de Cafetos enfermos.** [Control of 'cock's eye', *Omphalia flavida*, by means of defoliation of diseased Coffee trees.]—*Suelo tico*, 5, 24, pp. 42–51, 1 graph, 1951.

This is a translation into Spanish by M. Gutiérrez and J. M. Montero of an amplified version of the author's recommendations for the control of coffee leaf

spot (*Omphalia flavida*) [*Mycena citricolor*] in Costa Rica [*R.A.M.*, 31, p. 15] by means of defoliation, a note on which has already appeared [ibid., 30, p. 608]. The disease is responsible for an annual loss conservatively estimated at 20 per cent. of the crop, and in 1950 it was exceptionally serious owing to the heavy rains.

Progress Reports from Experiment Stations, season 1949–50.—140+v pp., 2 graphs, London, Empire Cotton Growing Corporation, 1951. 3*s.* 0*d.*

In the report [cf. *R.A.M.*, 30, p. 157] from the Gezira Station, Anglo-Egyptian, Sudan, R. R. Anson and K. C. Barlow state that Sakel plants resistant to leaf curl virus [loc. cit.] and obtained from selfed bulkings of R.D.S. Selections 1, 2, 3, and 4 in 1948–9, showed no trace of the disease when grown on an observation plot.

In breeding work at Shambat [ibid., 29, p. 211] R. L. Knight and J. E. Sadd found that the production of a Sakel resistant to leaf curl and blackarm (*Xanthomonas malvacearum*), carrying the B_2 factor [ibid., 31, pp. 115, 174], was completed, and seed of B_2B_3 Sakel was sown for bulk propagation; it is hoped to render the latter resistant to leaf curl next season. Breeding for resistance to blackarm is complete in the X. 1730 type as regards hybridization, and the B_2B_3 product is undergoing re-selection.

M. F. Rose states that at the Kadugli Station 430 single plants of BAR. 7/8, highly resistant to blackarm from Gannaya are being filtered in an attempt to raise the length and lint quality; counts on three occasions have demonstrated the marked resistance conferred by the genes B_2 and B_3 in this variety.

From the Cotton Experiment Station, Nyasaland, H. C. Ducker, W. L. Miller, and S. H. Evelyn report that in the Ndakwera village of the Chikwawa District a patch of wild *Sida carpinifolia* was found with symptoms typical of *Gossypium* virus 1 [cotton leaf curl virus: cf. ibid., 27, p. 184]; the same disease was later observed at Chikonje, Ngabu, and Bilila.

Reporting from Barberton, South Africa, A. R. Pullen states that a severe outbreak of *Verticillium* wilt [*V. dahliae*: ibid., 30, p. 156] was reported from the Magut area, northern Natal, in January, 1950, during a period of moderately heavy rainfall. Another attack occurred later in the season at Kaapmuiden, in the lower de Kaap valley, on vigorously growing, late-planted, irrigated cotton in the early flowering stage. On p. 2 of this publication J. B. Hutchinson states that the disease appears to be spreading in South Africa, and developments will be followed with interest as it may become more serious in other parts of Africa.

In co-operation with the College of Agriculture, Potchefstroom 'top' crosses of 'P×H' maize, resistant to maize streak [virus: ibid., 30, p. 559] on to standard susceptible varieties of white dent maize were tested, the F_1 hybrids showing an intermediate degree of resistance and giving a better yield than the susceptible parent under conditions favouring the disease. Some foreign varieties of *Hibiscus* (*H. cannabinus* and *H. sabdariffa*) were attacked by rust (*Aecidium garckeanum*) [ibid., 15, p. 779] at the time of flowering and seed-setting, infection being heaviest on the Egyptian varieties and only slight on the Brazilian.

Ghillini (C. A.). **I parassiti nemici vegetali della Canapa.** [Virulent plant parasites of Hemp.]—*Notiz. Malatt. Piante, 1951*, 15, pp. 29–36, 1951. [English summary, p. 100.]

Descriptions are given of the symptoms and control of the following diseases of hemp in Italy: *Bacterium* [*Pseudomonas*] *mori*, which occurs chiefly in recently drained or previously unworked soil; *Peronoplasmopara* [*Pseudoperonospora*] *cannabina* [*R.A.M.*, 15, p. 97]; *Sclerotinia sclerotiorum* [loc. cit.] and *Botrytis* sp. [ibid., 25, p. 501], which may cause serious damage but are controlled if affected plants are destroyed; and *Botryosphaeria marconii* [ibid., 25, p. 493]. The agents reported

to cause microbial deterioration of the fibres are listed and discussed [ibid., 7, p. 172; 28, p. 584].

KERR (H. B.). **Rust resistance in Linseed.**—*Nature, Lond.*, 169, 4291, p. 159, 1952.

In investigations on physiologic specialization in *Melampsora lini* [*R.A.M.*, 23, p. 437] and the resistance of flax at the University of Sydney, New South Wales [ibid., 31, p. 117], 15 Australian races have been identified using Flor's original set of differentials [ibid., 26, pp. 488–9] with two additional Argentine varieties. In 1949 a race was found in Western Australia attacking the immune Ottawa 770B. Australian race K demonstrates the allelic resistance factors postulated by Flor [loc. cit.]. Race A, however, suggests that Bison carries a single dominant factor for resistance, while Ottawa 770B and Newland each carry a factor (apparently in the *N* series [loc. cit.]) additional to those found by Flor, which in the former variety also operates against race E.

A more rapid and often higher percentage germination of uredospores, stored at 3·5° C. for varying periods, was possible by floating them on an aqueous extract of linseed seedlings. After eight months' storage germination was still up to 80 per cent., after 14 it was moderate, and was obtained in one case (25 per cent.) after 17 months.

When linseed shoots are excised above the cotyledons, placed in tap water or nutrient solution, and immediately inoculated with uredospores, normal rust reactions are obtained. Unless heavily infected, these shoots soon develop a root system and may be transplanted or left to set seed. One of the advantages of this new technique [cf. ibid., 31, p. 117] is that a rapid clonal increase of valuable plants is possible as the cut-back seedlings branch prolifically; thus one plant can be tested with any number of rust races simultaneously.

LONERAGAN (J. F.). **The effect of applied phosphate on the uptake of zinc by Flax.**—*Aust. J. sci. Res.*, Ser. B, 4, 2, pp. 108–114, 1951.

Pot experiments at the Institute of Agriculture, University of Western Australia, Nedlands, showed that the degree of severity of zinc deficiency symptoms in flax plants [*R.A.M.*, 31, p. 118] and the extent of the response to zinc treatment increased with the level of phosphate application.

ROSEN (H. R.). **Miriam's Climber. A new pink climbing Rose for Arkansas.**—*Rep. Ser. Ark. agric. Exp. Sta.* 20, 6 pp., 1950. [Abs. in *Hort. Abstr.*, 21, 3, p. 400, 1951.]

A description is given of the origin of Miriam's Climber, an outstandingly vigorous rose, highly resistant to frost damage and comparatively so to powdery mildew [*Sphaerotheca pannosa*: *R.A.M.*, 30, pp. 370, 610], black spot [*Diplocarpon rosae*: loc. cit.], and anthracnose [*Sphaceloma rosarum*: loc. cit. and ibid., 30, p. 584].

SERVAZZI (O.). **Botrytis elliptica (Berk.) Cooke parassita dei Gigli in Italia.** [*Botrytis elliptica* (Berk.) Cooke parasitic on Lilies in Italy.]—*Ann. Sper. agr.*, N.S., 5, 5, pp. 1139–1154, 1 pl., 1 graph, 1951. [English summary.]

In June, 1939, lilies (*Lilium candidum*) growing in a nursery near Turin were severely attacked by *Botrytis elliptica* [cf. *R.A.M.*, 14, p. 513; 30, pp. 17, 467; 31, p. 119], not before recorded on this host in Italy. The outbreak appears to have been favoured by warm, wet weather in May and June. The strain of the fungus isolated formed sclerotia in nature and in culture on some media. Control is recommended by the usual methods.

Holloman (A.) & Young (R. A.). **Evaluation of fungicides for control of the leaf-spot disease of Gladiolus caused by Botrytis gladiolorum Timmermans.**—*Plant Dis. Reptr*, 35, 10, pp. 456–458, 1951. [Multilithed.]

Evaluation trials of five fungicides for the control of leaf spot of *Gladiolus* caused by *Botrytis gladiolorum* [*R.A.M.*, 31, p. 119] were conducted in 1949 near Portland on the variety Pandora and in 1950 at Corvallis on Snow Princess. The sprays were applied weekly with a 3 gal. Hudson sprayer, operated at a pressure of about 50 lbs., starting about the 1st August, before the leaf spot had appeared. All spray mixtures contained triton B 1956 ($\frac{1}{2}$ pt. per 100 gals.). Ferbam (2 lb. per 100 gals. water) gave average values of a disease index based on percentage necrosis of 13·86 and 22·76 in the two trials. Values for nabam (2 qts.) in the first trial and the same plus zinc sulphate (1 lb.) in the second were 18·61 and 37·47, respectively, and for the untreated, 44·62 and 62·07, respectively. Ferbam, though actually even more effective relatively than is indicated by the differences in disease index, leaves a conspicuous black residue on foliage and flowers, and has, therefore, been recommended only to those who grow for corm production. Where sale of flowers is involved, nabam should be used.

Ciferri (R.). **Segnalazioni dell' Alternaria senecionis Neerg. su Senecio cruentus.** [Reports of *Alternaria senecionis* Neerg. on *Senecio cruentus*.]—*Notiz. Malatt. Piante, 1951*, 15, pp. 39–40, 1951. [English summary, p. 100.]

A disease of cinerarias caused by *Alternaria senecionis* identical with that described from Denmark [*R.A.M.*, 25, pp. 203, 383] and England [ibid., 29, pp. 155, 415] has been reported from the Botanical Garden, Pavia, on plants in the greenhouse. The disease did not develop in seedlings grown in the greenhouse from seed of infected plants.

Ark (P. A.). **California Orchids resistant to some diseases in habitat become susceptible in greenhouse.**—*Calif. Agric.*, 5, 2, pp. 7, 14, 4 figs., 1951.

The most important diseases in the Californian orchid industry have already been described [*R.A.M.*, 29, p. 308; 30, p. 372]. The destructive brown spot disease (*Phytomonas* [*Bacterium*] *cattleyae*) progresses rapidly from the leaf base to the growing point in *Phalaenopsis*. In *Cattleya* the sharply delimited, nearly black spots are often confined to the upper part of the leaf and the disease is seldom fatal.

Scorch and pseudo-bulb rot (due to an unnamed bacterium) on *Miltonia* hybrids [loc. cit.] is most severe in the cool, moist greenhouses in which these plants flourish. The bacteria are exuded copiously on the leaf surface and may be spread by syringing operations from one plant to the next.

Soft rot of *Cattleya* caused by *Erwinia carotovora* [ibid., 22, p. 207] is of rare occurrence, but its advent (always sudden) is attended with devastating results. Diseased plants cannot be saved and should be promptly burnt, and the place thoroughly disinfected.

Black spot of *Vanda* flowers (*Glomerella* sp.) [cf. ibid., 29, pp. 155, 157] occurs before cutting and shipping, progressing only slowly at the low temperature prevailing in transit, but in the warmth of the sales room the symptoms develop and ruin the market value of the flowers. Used at 1 in 2,000, 8-quinolinol benzoate prevents black spot without injury to the host.

Démétriadès (S. D.). **Un parasite nouveau du Gardenia.** [A new parasite of *Gardenia*.]—*Ann. Inst. phytopath. Benaki*, 4, 1–2, pp. 11–13, 2 figs., 1950.

In the spring of 1940 the author received *Gardenia* leaves from the island of Spezzia, Greece, with a rather marked discoloration of the blade, bearing white spots 1 to 3 mm. in diameter surrounded by a narrow brown zone. Some spots bore

pycnidia containing ellipsoidal, bicellular, olivaceous spores, measuring 7 to 9 by 3 to 3·5 μ. The fungus is described and named *Microdiplodia gardeniae* n. sp.

Perišić (M. M.). Прилог проучавању циклуса развића **Puccinia helianthi** Schw. на Сунцокрету код нас. [Contribution to the study of the development cycle of *Puccinia helianthi* Schw. on Sunflower in our country.]—Год. пољоп. Фак., Београд. [*Yearb. Fac. Agric., Beograd*], *1950–1951*, 3, pp. 213–219, 3 pl., [? 1951. French summary.]

Aecidia of *Puccinia helianthi* [*R.A.M.*, 8, p. 791; 12, p. 235; C.M.I. map No. 195] were found on sunflower for the first time in Yugoslavia in 1947. They occurred throughout its growth period and developed even on the inflorescence. They were also present in the autumn on spontaneous seedlings, showing that the teleutospores of *P. helianthi* can germinate before winter. Aecidia were very numerous on the susceptible varieties Saratov 169 and Novi Sad 8. Infection with the aecidiospores resulted in the development of uredospores seven days later in the greenhouse at 20° C., and 12 days later in the field at 25·5°. Jerusalem artichoke [*Helianthus tuberosus*] could not be infected by uredospores.

Grushevoi (S. E.). Перспективы использования многолетних бобовых трав в борьбе с Заразихой и черной корневой гнилью в Табачном севообороте. [Prospects of using perennial leguminous forage crops for the control of *Orobanche* and black root rot in field rotations with Tobacco.]—*C.R. Acad. Sci. U.S.S.R.*, N.S., **2**, 1, pp. 17–21, 1949.

Experiments carried out in 1941 at the Pan-Scientific Institute for Tobacco and 'makhorka' [*Nicotiana rustica*], U.S.S.R., in fields infested with *Thielaviopsis basicola* [*R.A.M.*, 30, p. 127] demonstrated the high resistance to the pathogen of certain varieties of red clover, especially Nos. 352 and 358 (no spring infection) and 351 and 362 (0·1 per cent. spring infection). Strain 360 gave 26 per cent. spring infection. Lucerne was also resistant (infection varying from 9·4 to 20·8 per cent. in the spring and from 10·7 to 35·6 per cent. in the autumn), but to a lesser degree.

Evidence obtained in rotation experiments confirmed that the incidence of *T. basicola* in the soil decreases when resistant hosts are grown [loc. cit.]. Thus tobacco grown for five and seven consecutive years (without fertilizers) developed 32·6 and 94 per cent. infection, respectively, whereas that grown for two consecutive years after clover or lucerne had only 3·9 and 5·5 per cent., respectively, and for three consecutive years after these hosts 22·9 and 24·1 per cent., respectively.

Crop rotation with clover is recommended for tobacco areas where black root rot is prevalent.

Loveless (A. R.). **The confirmation of the variety fabae Keay of Sclerotinia trifoliorum Eriksson.**—*Ann. appl. Biol.*, 38, 1, pp. 252–275, 1 pl., 1 graph, 1951.

At the Botany School, Cambridge, a comparison was made of *Sclerotinia trifoliorum* on broad beans [*R.A.M.*, 26, p. 61] and on clover and related leguminous crops [ibid., 31, p. 18] to assess the status of *S. trifoliorum* var. *fabae* [ibid., 27, p. 283]. The author concludes that, although indistinguishable from the species in general apothecial characters and cultural behaviour, var. *fabae* is distinct on account of the greater ascospore size [ibid., 18, p. 629] and the formation of an incompatibility line [ibid., 22, p. 98] in culture between the normal strain and var. *fabae*.

Of the 17 isolates of *Sclerotinia* from broad beans examined, 14 agreed in spore size with *S. trifoliorum* var. *fabae* and three with *S. trifoliorum*. Var. *fabae* was not found among 22 isolates of *S. trifoliorum* from other leguminous hosts, 16 from red clover, three from trefoil, and three from sainfoin (*Onobrychis sativa*). Since bean

rot may sometimes be due to *S. trifoliorum* it appears unwise to follow either beans or clover with the other host in a rotation.

Williams (R. D.). **The effects of deficiencies of several trace elements on Timothy (Phleum pratense L.) grown in solution culture.**—*Plant & Soil*, 3, 3, pp. 257–266, 4 figs., 1951.

In a greenhouse experiment at the Grassland Research Station, Stratford-on-Avon, seedlings of the Aberystwyth S. 48 strain of timothy grass (*Phleum pratense*) were grown in culture solutions lacking certain elements. Copper deficiency symptoms [*R.A.M.*, 23, p. 220; 28, p. 629] first appeared just over three weeks after transference to the solution. The leaves turned very dark green (not the dark bluish-green characteristic of phosphorus deficiency) and lost a little of their turgor; three weeks later, the youngest fully expanded leaves developed a characteristic tip necrosis. The distal third or less of the leaf rolled inwards from the edges, dried, withered, and finally turned whitish. Younger leaves next became affected, the tips withering and dying before expansion and even before emergence from the subtending leaf, so that while the base continued to grow the tip remained enclosed in the next oldest leaf and so became looped. Sometimes as many as three successive leaves behaved in this way, giving the plants a tangled, untidy appearance. One plant produced flowers, but only one very small inflorescence.

The first symptoms of zinc deficiency [ibid., 30, p. 489] appeared when the plants had been five weeks in the culture. They became pale and greyish and appeared somewhat stunted, their leaves being shorter in relation to their width than those of normal plants. They grew stiffly upwards, and did not bend over in the middle as readily as normal leaves. Simultaneously with the appearance of these symptoms some older leaves became chlorotic or necrotic. The chlorosis consisted in complete loss of colour, the affected patches turning white and then becoming necrotic, or becoming necrotic without preliminary chlorosis. Younger leaves developed (generally near the middle) irregular, greyish-brown, necrotic patches sometimes spreading across the whole width of the leaf, which then collapsed, the distal portion dying. Other leaves died back from the tip. Wood and Sibley reported similar symptoms of zinc deficiency on oats [cf. ibid., 29, p. 612].

Plants deficient in manganese were late in displaying clearly defined symptoms, though they made less growth than the controls and after six weeks appeared weak and somewhat pale. Reduced growth affected tillering, the plants being smaller than the controls; the leaves were limp and appeared narrower but not shorter than normal. The general effect was a spindly appearance. Definite symptoms appeared after 13 weeks' growth. In the middle of the youngest leaves interveinal necroses developed, spreading and occasionally cutting right across the leaf, which collapsed in the middle, the tip remaining green. The symptoms followed the same general pattern as in oats, but the necrotic areas were pale yellow-brown or white; the 'grey speck' condition [cf. ibid., 7, p. 397; 11, p. 295; 15, p. 355; 20, p. 458, *et passim*] did not develop.

No symptoms of boron or molybdenum deficiencies appeared. Iron deficiency symptoms occurred fortuitously in some treatments.

Preston (A. P.), Moore (M. H.), & Bennett (Margery). **The influence of rootstock on spray damage in Apple.**—*Rep. E. Malling Res. Sta., 1950*, pp. 132–136, 1951.

In 1949 eight-year-old Cox's Orange Pippin apple trees on a series of new stocks and on standard Malling rootstocks were sprayed at fruitlet stage with 1½ per cent. lime-sulphur and the treatment was repeated the following season. Significant differences were observed among the stocks within vigour groups for leaf scorch,

defoliation, and fruit drop recorded after spraying [*R.A.M.*, 25, p. 456; 30, p. 599]. In general, trees on dwarfing stocks, both standard and new, suffered less damage than those on vigorous ones. The vigorous rootstocks 3430 and 3438 (of M. IX (dwarfing) × M. XII (vigorous) parentage) behaved similarly to M. XII. Trees on 3431 (dwarfing) and 3432 (intermediate) (progeny of M. IX × M. XIII) also showed the alliance of vigour with susceptibility to spray damage, 3431 conferring less susceptibility and 3432 considerably more than M. IX.

Since rootstock appears to influence both spray damage and susceptibility to scab [*Venturia inaequalis*: ibid., 13, p. 523] in the scion there is some prospect of widening the narrow safety margin between damage to the host plant and toxicity to the pathogen.

Byrde (R. J. W.) & Marsh (R. W.). **Apple and Pear scab spraying experiments at Long Ashton, 1949 and 1950.**—*Rep. agric. hort. Res. Sta. Bristol, 1950*, pp. 125–131, [? 1951].

During the hot, dry summer of 1949 the development of apple scab [*Venturia inaequalis*] was too slight for fungitoxicity comparisons in field trials at Long Ashton, Bristol. In the cool, wet season of 1950, however, a programme of one pre-blossom and one post-blossom spray with glyoxalidine 341-C at 1 qt. per 100 gals. [*R.A.M.*, 30, p. 234; 31, p. 67] equalled the standard lime-sulphur programme in scab control on Cox's Orange Pippin and was less phytotoxic. The glyoxalidine sprays were also much less phytotoxic than lime-sulphur on Lane's Prince Albert and Stirling Castle and caused no decrease in yield in 1949 and 1950 when applied against pear scab [*V. pirina*: ibid., 28, p. 68] on Doyenné du Comice, which is seriously damaged by lime-sulphur.

In preliminary tests with phygon XL, a substituted pyrazole (J. 49), and the phthalimide preparation SR-406 [ibid., 31, p. 67], on four Worcester Pearmain apple trees selected at random, the last-named reduced leaf scab to less than 2½ per cent. of that on the unsprayed trees and was not phytotoxic.

McCrory (S. A.) & Shay (J. R.). **Apple scab resistance survey of South Dakota Apple varieties and breeding stocks.**—*Plant Dis. Reptr*, 35, 10, pp. 433–434, 1951. [Multilithed.]

During an unprecedented epiphytotic of apple scab (*Venturia inaequalis*) [*R.A.M.*, 28, p. 337] in South Dakota, hundreds of apple varieties were examined and the following found to be free from the disease: Cathay (*Malus prunifolia* var. *rinkii*), Elk River (*M. ioensis*), Kola (Elk River × Duchess), Red Tip (Elk River × *M. pumila* var. *niedzwetskyana*), S. D. Jonsib (Jonathan × *M. baccata*), Tipi (Elk River × Duchess), Zapta (Elk River × Bismark), and Antonovka monasir (the only one of several Russian varieties). Six seedlings, three from an open pollinated Cathay Crab seedling, Nevis × Dolgo, Unknown × Hopa, and open pollinated Antonovka monasir (cross numbers: T 1641, T 3103, T 3145, and T 3255, respectively) at Watertown and Brookings, and six of the 1,300 seedlings of *M. baccata* examined at the Hansen Nursery, Brookings, were free from scab infection. The susceptibility of Alexis and Dolgo (seedlings of *M. baccata cerasifera*) is of considerable interest since in greenhouse infection tests in Indiana, using Illinois, Indiana, and Wisconsin isolates of the fungus, they both showed necrosis without sporulation and have remained scab-free in the field in Indiana since 1948. Some segregates of Dolgo × Wealthy, propagated and tested in Indiana, have proved as resistant as the Dolgo parent. It would appear, then, that a different race of *V. inaequalis*, capable of attacking Dolgo and Alexis, is present in South Dakota, or that the varieties maintained there are different from those of the same name in Minnesota, where scions for the Indiana tests were obtained.

Wenzl (H.), Creuzburg (U.), & Hanspeter (A.). **Ergebnisse von Apfelschorfversuchen 1948-1950.** [Results of Apple scab experiments 1948 to 1950.]—*PflSch. Ber., Wien*, 7, 1–2, pp. 16–22, 1951.

For the control of apple scab [*Venturia inaequalis*] in Austria from 1948 to 1950 neutral lead arsenate proved superior to acid lead arsenate (both at 0·4 per cent.) as an adjunct to lime-sulphur (1·67 and 2·35 scab index numbers for pre- and post-blossom treatments, respectively). The relative inefficiency of the acid product is attributed primarily to its very low degree of suspensibility.

The beneficial effects of an admixture of copper oxychloride with lime-sulphur, already reported from Switzerland [*R.A.M.*, 31, p. 67], were confirmed in this series of experiments. The mixture, however, should not be applied to extremely sulphur-shy varieties on which it induces pronounced scorching.

Used at a concentration of 1 per cent., pomasol [loc. cit.] was appreciably more effective as a post-blossom spray than 1·5 per cent. lime-sulphur. A week's delay in the application of the first post-blossom treatments in Upper Austria and Styria in 1950 gravely impaired the efficacy of both lime-sulphur (even with the addition of 0·5 per cent. copper oxychloride) and pomasol, a fresh proof of the necessity for promptitude at this critical stage [cf. ibid., 30, p. 46].

Palmiter (D. H.). **A blossom end rot of Apples in New York caused by Botrytis.** —*Plant Dis. Reptr*, 35, 10, pp. 435–436, 2 figs., 1951. [Multilithed.]

Since 1946 a blossom-end rot of apple due to *Botrytis cinerea* [? dry eye rot: *R.A.M.*, 21, p. 459] has been affecting McIntosh [ibid., 27, p. 368], Cortland, Rome Beauty, and other varieties in the Hudson Valley, and in 1951 it was more prevalent than in any previous year. In experimental plots and in commercial McIntosh orchards some trees showed from 1 to as much as 6 per cent. of diseased fruits in early July, both unsprayed trees and those receiving a regular sulphur spray programme being similarly affected. Apparently the sepals became infected at the end of flowering in May during a prolonged wet or rainy period with temperatures between 46° and 48° F., fruits in an upright position being most susceptible. Trees sprayed with fermate (1½ lb. to 100 gals.) showed reduced infection. Applications of crag 341 (1½ qts.) and orthocide 406 (2 qts.) just before the rainy period, or phygon (½ lb.), puratized agricultural spray (1 pt.), and dynacide (½ lb.) [see above, p. 181] at the end of the rain, also resulted in good control.

Crosse (J. E.) & Bennett (Margery). **Black rot and leaf spot of Apple due to Physalospora obtusa (Schw.) Cooke.**—*Rep. E. Malling Res. Sta., 1950*, pp. 137–138, 1 pl., 1951.

In August, 1950, an outbreak of leaf spot and black rot caused by the *Sphaeropsis* state of *Physalospora obtusa* [*R.A.M.*, 30, p. 475] was observed in Kent in an orchard of mature Worcester Pearmain and Lord Derby apple trees. Diseased fruits of the latter were scarce but 25 to 30 per cent. of the Worcester crop was affected; leaf spotting was equally severe on both varieties. Later the disease was discovered in another orchard near by where of six varieties, including Lord Derby, only Worcester Pearmain was affected. In England only the leaf spot stage has hitherto been described on orchard trees [ibid., 15, p. 726].

All the infections on Lord Derby had originated through the eye or some obvious crack or insect puncture, but most of the Worcester Pearmain infections were not associated with any visible wound. *Sphaeropsis* pycnidia pathogenically and culturally identical with those on the fruits were abundant on dead twigs and branches showing die-back and evidently provided inoculum for leaf and fruit infection. Several mycelial isolations made from the edge of lesions on twigs with no pycnidia all produced a rot when inoculated into fruits. Since both orchards

concerned in the present outbreak had received the normal spray programme against *Venturia inaequalis* the importance of removing dead wood, mummified apples, prunings, and any other substrate on which the fungus might overwinter is emphasized.

Moore (M. H.). **Brown rot of Apples: note on infection associated with hail bruises and lenticels.**—*Rep. E. Malling Res. Sta., 1950*, p. 131, 2 pl., 1951.

In September, 1950, Bramley's Seedling apples in an orchard near Maidstone, Kent, were liberally infected with brown rot (*Monilia* [*Sclerotinia*] *fructigena*) [*R.A.M.*, 30, p. 168], some of the infection having gained entry through small fissures, produced by gradual stretching of the skin overlying hail bruises contracted some six weeks earlier, and in one case through a lenticel.

Bremer (H.). **Zur Epidemiologie des Gitterrostes an den Birnbäumen in der Türkei.** [Contribution to the epidemiology of the palisade rust of Pear trees in Turkey.] —*Sydowia*, 5, 1–2, pp. 13–22, 1951.

The frequent epidemics of *Gymnosporangium sabinae* on pear in Anatolia, Turkey [*R.A.M.*, 30, p. 170], are attributed to the mountainous character of the country, which tends to bring the trees into close contact with the alternate hosts of the rust, *Juniperus oxycedrus* and *J.* [*communis* ssp.] *nana*. In the Ankara district infection of pear leaves was found to occur at greater distances (up to 5 or 6 km.) from junipers than had previously been demonstrated. The annual fluctuations in the intensity of the disease are governed by the weather prevailing during the critical period for infection (May at Ankara), a high incidence being associated with humid conditions at this time.

Scaramuzzi (G.). **La clorosi del Pesco nella zona di Albenga saggiata col 'teste di Roach' e similari.** [Peach chlorosis in the Albenga region detected by Roach's test and similar methods.]—*Notiz. Malatt. Piante, 1951*, 15, pp. 56–65, 1951. [English summary, p. 101.]

A characteristic leaf chlorosis has been observed throughout the peach growing area around Albenga, Liguria. All varieties appear to be similarly affected. Rapid mineral injections by Roach's method [*R.A.M.*, 28, pp. 357, 508] and leaf painting indicated that it was due to a complex deficiency of iron [ibid., 28, p. 177] and zinc [ibid., 29, p. 569].

Scaramuzzi (G.). **La 'rosetta a foglie saliciformi' del Pesco: una nuova malattia da virus.** ['Willow leaf rosette' of Peach trees: a new virus disease.]—*Notiz. Malatt. Piante, 1951*, 15, pp. 40–46, 1951. [English summary, pp. 100–101.]

In April, 1950, there was an extension of the previously reported virus disease of peach trees in Italy [*R.A.M.*, 29, p. 315] in the areas of Magliolo and Bardino Nuovo. It was estimated that about 50,000 trees were affected in the two zones, nearly all grafted on peach but some on plum. All the locally grown varieties were affected, notably Amsden, Morettini I, Hale, Waddel, Impero, Elberta, Trionfo, Aurora, Gambetta, Buggian, Dessiè, Michelin, Chilon, and Cervetto, of which Elberta seemed the most susceptible. Some growers claimed to have observed the primary symptoms seven to eight years ago but in most cases they appeared four to five years ago. The first deaths occurred in 1946 and 1947. All the foliage of one tree may be affected or only a part, sometimes only a few twigs being involved. The disease spreads slowly (4 to 5 years) in adult trees and rapidly (1 to 2 years) in younger ones, though it may take only two months in freshly planted seedlings.

The leaves are much smaller than usual, are long and narrow like willow leaves, and tend to fold in half lengthways. They are also darker green and thickened, with paler veins. In May many leaves were thickened, distorted, and dark green with mottled chlorotic areas of different sizes. Some young leaves bore the speckly chlorosis but were rounded rather than elongated. The symptoms described by Biraghi [loc. cit.] are reported to appear towards the middle of July, continuing to September. Flowering is retarded by up to 15 days and leaf production by 15 to 20 days. Fruit setting is scarce or absent during the first year in which leaf symptoms are observed and is reduced in successive years. Any fruits formed are small and deformed, bearing knots.

The virus nature of the disease was established by its appearance after six to seven months in healthy scions grafted on to diseased stocks. Since the symptoms do not correspond with those of any other virus disease of peach it is believed to be new.

[This paper also appears in *Humus, 1951*, 7, 6 pp., 8 figs., 1951.]

Cadman (C. H.) & Harris (R. V.). **Raspberry virus diseases : a survey of recent work.**—*Rep. E. Malling Res. Sta., 1950*, pp. 127–130, 1951.

Most of the recent work on raspberry virus diseases described in this paper has already been noticed in this *Review*. They are classified into two groups, the first including diseases of single virus origin which produce visible symptoms on all European varieties of *Rubus idaeus* examined, such as mild, medium [*R.A.M.*, 27, p. 141], and severe vein chlorosis; veinbanding mosaic, believed to be Harris's mosaic 1 [ibid., 19, p. 293]; yellows diseases [ibid., 29, p. 513]; leaf curl [ibid., 22, p. 441]; and *Rubus* stunt [ibid., 30, p. 376]. Group II, comprising diseases which produce visible symptoms on some, but not all, such varieties, includes Harris's mosaic 2 [ibid., 27, p. 246]; latent mosaic diseases, such as leaf mottle, which causes conspicuous chlorotic spotting, resembling mosaic 2 on Malling Landmark and certain other varieties, and necrosis on *Rubus henryi*; curly dwarf [ibid., 29, p. 315]; and bushy dwarf which is carried without visible symptoms by Norfolk Giant but induces cane dwarfing, downward leaf curl, and diffuse chlorosis on Lloyd George. A tentative assessment of the relative significance of these diseases is made.

Bazán de Segura (Consuelo). **La enfermedad de los Paltos de Chanchamayo.** [The Avocado disease of Chanchamayo.]—*Bol. Estac. exp. agríc., Lima*, 42, 7 pp., 7 figs., 1951. [Mimeoprinted.]

Avocado root rot caused by *Phytophthora cinnamomi* [*R.A.M.*, 31, p. 25] has already involved some 50,000 avocado trees, mostly between 18 and 22 years old, on hard-pan soils in the Valley of Chanchamayo, Peru. Control measures should include all cultural practices necessary to facilitate drainage of the excessively humid local soils, development of resistant varieties, use of guano and lime as fertilizers, and alternation in new plantings of avocado and orange, the latter serving as an insurance against the heavy economic losses which may be sustained through the failure of the former.

Simkover (H. G.) & Shenefelt (R. D.). **Effect of benzene hexachloride and chlordane on certain soil organisms.**—*J. econ. Ent.*, 44, 3, pp. 426–427, 1951.

In preliminary tests at the Wisconsin Agricultural Experiment Station, using the technique of Wilson and Choudhri (*J. agric. Res.*, 77, pp. 25–32, 1948), crude benzene hexachloride [*R.A.M.*, 31, p. 133], sprinkled over agar slants of *Rhizoctonia*, caused a marked inhibition of mycelial growth. Similarly, the gamma isomer at the rate of 1 lb. per acre controlled damping-off by a virulent strain of the fungus in Norway pine [*Pinus resinosa*] seedlings on Plainfield sand. At $\frac{1}{4}$, $\frac{1}{2}$, and 1 lb. per acre the compound also stimulated mycorrhizal growth in the seedlings. At

increased dosages (up to 5 lb.) it caused severe root clubbing. Chlordane was ineffective in all three tests.

Tehon (L. R.). **Fungistatic potencies of some fluorinated *p*-benzoquinones.**—*Science*, 114, 2973, pp. 663–664, 1 graph, 1951.

Bioassays by the Peterson method [*R.A.M.*, 21, p. 211] of the fungicidal efficiency of five fluorinated *p*-benzoquinones against a spore suspension of *Macrosporium* [*Stemphylium*] *sarciniforme* [ibid., 30, pp. 175, 482, 615; 31, p. 27] were made at Urbana, under the auspices of the Illinois State Natural History Survey. The most effective in inhibiting germination was 2,5-difluoro- 1, 4-benzoquinone giving an LD_{50} value of 2·6 p.p.m. and an LD_{95} of 6·4 p.p.m. on the dosage-response curve. The corresponding values for the other compounds were: 2-fluoro-1, 4-benzoquinone 4·4 and 15; 2-fluoro-5-bromo-1,4-benzoquinone 8·4 and 20·2; 2-fluoro-5-chloro-1,4-benzoquinone 13 and 23·5; and 2-fluoro-5-methyl-1,4-benzoquinone 36 and 70. The difluoro compound was also tested against spores of *Alternaria solani* and gave an LD_{50} value of 7·1 and an LD_{95} of 17 p.p.m. In these experiments the substitution of a bromine atom gave a more effective compound than the substitution of a chlorine atom, when a substitute fluorine atom was also present. Methylation appeared to diminish toxicity appreciably.

Manten (A.), Klöpping (H. L.), & Van der Kerk (G. J. M.). **Investigations on organic fungicides. I. The antimicrobial spectrum of the antifungal substance tetramethylthiuram disulphide. II. A new method for evaluating antifungal substances in the laboratory.**—*Antonie van Leeuwenhoek J. Microbiol. Serol.*, 16, pp. 45–55, 282–294, 2 pl., 1950.

In studies at the Organic Chemistry Institute, Utrecht, Holland, on the antimicrobial spectrum of thiram [*R.A.M.*, 30, p. 177 and next abstract], the substance in general exhibited antifungal rather than antibacterial properties, though the bacteria as well as the moulds varied considerably in their sensitivity, parasitic fungi being in general more sensitive than the saprophytic. *Botrytis cinerea* was 75 times more sensitive than *Aspergillus niger*, the minimum dose for complete inhibition of the former being 0·4 p.p.m.; this concentration also inhibited *B. allii* and *Penicillium italicum*. It is suggested that the fungicide acts probably by interference with the anabolic phase of mould metabolism. Its mode of action is briefly discussed.

In the second paper results are given of laboratory experiments for testing the antifungal activity of thiram against 14 different fungi, using four different methods, namely, the plate [ibid., 29, p. 40], the roll-culture [ibid., 30, p. 482], the slide germination [ibid., 31, p. 25], and a gravimetric liquid culture method. The second proved most practical for routine work and is described fully. The roll-culture, slide, and gravimetric methods were in fairly good agreement. Divergent results with the slide test were due mainly to the influence of the substrate upon the moulds rather than upon the antifungal substance, the curves obtained with this method being flattered in some cases owing to unfavourable nutrient conditions. To obtain a fair idea of the practical value of organic fungicides, laboratory evaluation of antifungal activity should be conducted under approximately optimum nutrient conditions, 'complete medium' tests being preferable. In this series of tests *Fusarium avenaceum* was completely inhibited at 10 p.p.m.

Cox (C. E.), Sisler (H. D.), & Spurr (R. A.). **Identity of gaseous toxicants from organic sulfur fungicides.**—*Science*, 114, 2972, pp. 643–645, 1 graph, 1951.

The authors describe studies carried out at the University of Maryland on the identity of gaseous toxicants from nabam [*R.A.M.*, 30, p. 380], thiram [see

preceding abstract], and other related fungicides. Volatile toxic materials other than carbon disulphide were not detected over suspensions of thiram and living cells, and none was detected over suspensions of thiram alone. Over solutions of dithane D-14 hydrogen sulphide and carbon disulphide were present, but over solutions of different concentrations of two purified samples of nabam (the active ingredient of D-14) there was no hydrogen sulphide, though measurable quantities of carbon disulphide were released shortly after the solutions were prepared and continued to be liberated for several days. The percentage of spores of *Colletotrichum phomoides* and *Fusarium 'roseum'* germinating in drops exposed over water was above 90, but none germinated over a carbon disulphide-water mixture; over a 10 gm. per l. solution of purified nabam *C. phomoides* gave no germination and *F. roseum* 9 per cent. Over nabam solutions at 1, 0·1, and 0·01 gm. per l. germination was intermediate between these extremes and increased with decreasing concentrations.

With a 1 per cent. silver nitrate solution as indicator 4 p.p.m. of nabam in solution may be detected readily by a colour change, but when silver nitrate was exposed for 72 hours in sealed desiccators containing 500 ml. of 1 per cent. nabam solution no colour change occurred.

Infra-red spectroscopy showed that the vapour emanating from a solution of nabam evidently contained carbon disulphide and ethylene diamine [cf. ibid., 23, p. 264].

Methoden van het Rijksproefstation voor Zaadcontrôle voor het onderzoek van zaaizaden. [Methods used at the State Seed Testing Research Station for the analysis of seeds for sowing.]—80 pp., Rijksproefstation voor Zaadcontrôle, 's-Gravenhage, 1951.

Included in this useful booklet (No. 12 in the 'Landbouw' series) on official methods of seed-testing in Holland is a section (pp. 63–64) on the evaluation of fungicidal treatments against seed-borne diseases.

Kearns (H. G. H.) & Morgan (N. G.). **An experimental 'air flow' small volume sprayer and duster. Abridged specification.**—*Rep. agric. hort. Res. Sta. Bristol, 1950*, pp. 132–137, 2 pl., [? 1951].

A description is given of an experimental general-purpose air flow machine for studying the behaviour of droplets of plant protection materials applied to a wide range of crops [*R.A.M.*, 30, p. 236 and next abstract]. It consists of a chassis, engine unit, fan, two 60-gal. tanks, tank filters and filler, agitator pump, suction filter, $\frac{3}{4}$ in. B.S.P. gear pump with a maximum delivery of 10 gals. per minute at 100 lb. per sq. in. at 1,000 r.p.m., delivery return circuit to spray nozzles, fan nozzle and spray nozzle assemblies, and dusting equipment, mounted on a lorry. The fan delivers up to 20,000 cu. ft. of air at 5 in. W.G. pressure and 10,000 cu. ft. at 12 in. The volume of spray liquid applied can be adjusted from a few fluid ounces to 10 gals. per minute at up to 150 lb. pressure per sq. in. and the air stream delivered in any direction.

New low-volume sprayer. A fast worker on large acreages, it is also suitable for dusting.—*Fruit-Grower, 1952*, 2929, p. 289, 1 fig., 1952.

Designed and developed in Holland, a new spraying and dusting machine, the Whirlwind Professor [cf. *R.A.M.*, 30, pp. 430, 589], manufactured by Messrs. Universal Crop Protection Ltd., London, has a tank capacity of 88 gals., which, it is claimed, allows 50 minutes' spraying at full power, covering five or six acres at 2 to $2\frac{1}{2}$ m.p.h. [cf. ibid., 31, p. 133]. The flow of liquid per minute can be adjusted from 0 to 14 pints [cf. preceding abstract] while the machine is being operated,

without altering the droplet size, which can be changed from 40 to 100 μ to suit the prevailing weather. One air stream from a rotary compressor meets the flow of liquid from a single large nozzle in the centre of the outlet at an angle of 90° and causes atomization. A second air stream, generated by a centrifugal fan and travelling at 100 m.p.h., carries the droplets into the trees. The throw is about 120 ft. horizontally in a 5 m.p.h. wind and 60 ft. vertically in still air.

For dusting there is a 2-cwt. hopper which feeds the dust into the carrying air stream at a rate of from 0 to 35 lb. per minute. The dusting swathe is estimated at from 750 to 1,000 feet in a 5 m.p.h. wind. One operator is required in addition to the driver.

The machine, 13ft. 9 in. long, 4 ft. 10 in. broad, and 5 ft. high, weighs 19½ cwt. and will cost approximately £900.

Booer (J. R.). **The action of mercury as a soil fungicide.**—*Ann. appl. Biol.*, 38, 2, pp. 334–347, 13 graphs, 1951.

In further studies on the action of mercury as a soil fungicide [*R.A.M.*, 24, p. 199; 26, p. 477], carried out at Tilgate Horticultural Station, Crawley, Sussex, the author demonstrated experimentally that mercury in the soil has a retarding effect on healthy plants, particularly dicotyledons, the effect varying widely with the species and the environment. The primary action of mercury is to retard root development, any effect on the aerial parts being a sequel to this. Metallic mercury inhibited the development of mosses and lichens and roughly halved the rate of mycelial growth of a complex mixture of fungi developing on crushed seeds in a Petri dish with a small globule of the element. Pot tests indicated that the addition of mercurous chloride to soil appreciably retards the development of actinomycetes, and lawn treatments substantially impeded the growth of lawn fungi without reducing the total number.

When cauliflower was grown under glass in pots of soil heavily infected naturally with *Plasmodiophora brassicae* [see above, p. 170] the addition of 0·01 per cent. mercury resulted in 75 per cent. clean roots, 25 per cent. moderate or slight infection, and no severe clubbing, the corresponding figures for untreated soil being 4, 4, and 92 per cent. In a similar experiment with *Fusarium lini* [flax] seedling losses six weeks after sowing were two per cent. in the treated series and 64·25 per cent. in the untreated. Work on the control of white rot of onions (*Sclerotium cepivorum*) in naturally infected soil showed that a significant decrease in control and yield resulted from an excessive concentration of mercury (in the form of mercurous chloride) in the soil.

These results show that for any theory of the action of mercury as a soil fungicide the above facts must be taken into account. The author expresses the view, supported by data on comparative growth rates, that any favourable influence of mercury on fungus—host relations is due to the fact that it retards the fungus more than the host. Thus, the poor fungicidal properties of mercury and its good performance in controlling certain soil-borne diseases are reconciled by assuming that this differential retardation disturbs the conditions necessary for infection. It is recommended that all preliminary trials with mercury for the control of soil-borne diseases should be made with at least two concentrations; if the higher is the less effective, the results should not necessarily be regarded as conflicting.

Stiles (W.). **Trace elements in plants and animals. Second edition.**—xi+189 pp., 13 figs., Cambridge, University Press, 1951. 15*s*.

This edition [cf. *R.A.M.*, 26, p. 29] contains a few minor corrections and additions to the text and an additional photograph showing the symptoms of molybdenum deficiency in cauliflower [ibid., 30, p. 255].

Roger (L.). **Phytopathologie des pays chauds. Tome I.** [Plant pathology in the tropics. Volume I.]—(*Encycl. mycol.*, 17), 1,126 pp., 1 pl., 150 figs., 3 diags., 2 maps, Paris, Paul Lechevalier, 1951. Fr. 9,000.

This treatise, the first of three volumes dealing with plant pathology in the tropics [*R.A.M.*, 30, p. 424], is divided into two parts, the first dealing with the principals of phytopathology, parasitic and non-parasitic diseases, and control methods in the following chapters: I (pp. 3–16) general aspects; II (pp. 17–54) teratology, and various anomalies and malformations; III (pp. 55–202) and IV (pp. 203–252) non-parasitic and parasitic diseases, respectively; V (pp. 253–283) methods of defence in plants from the point of view of susceptibility, resistance, and immunity; VI (pp. 284–315) predisposition and receptivity; VII (pp. 316–349) effects of parasitism, pathological phenomena, and damage; VIII (pp. 350–374) origin, propagation, and further development of parasites and diseases; and IX (pp. 375–520) control methods.

The first section of Part II includes descriptions of cryptogamic diseases of tropical plants caused by fungi, algae, and lichens and contains in five chapters (pp. 525–1,112) a study of fungi in general, the Myxomycetes, Plasmodiophoraceae, Phycomycetes, and Basidiomycetes.

Clifton (C. E.), Raffel (S.), & Barker (H. A.). **Annual review of microbiology. 5.**—ix+379 pp., 1 pl., 1 fig., 2 charts, Stanford, California, Annual Reviews, Inc., 1951. $6.

This review [cf. *R.A.M.*, 29, p. 163; 30, p. 281] comprises 19 papers summarizing current work in various fields of microbiology. K. A. Bisset (pp. 1–16) discusses the morphology and cytology of bacteria (118 references) [cf. ibid., 28, p. 274] and V. M. Cutter (pp. 17–34) the cytology of the fungi (140 references); R. Y. Stanier (pp. 35–56) deals with enzymatic adaptation in bacteria (94 references) and J. J. Christensen and J. M. Daly (pp. 57–70) with adaptation in fungi (103 references) [cf. ibid., 8, pp. 436, 496; 28, p. 483]; G. N. Cohen (pp. 71–100) treats of the metabolism of bacteria (218 references), J. W. Foster (pp. 101–120) the metabolism of fungi (165 references) [cf. ibid., 29, p. 108; 30, p. 116], and W. A. Krehl and S. J. Liao (pp. 121–138) the nutrition of bacteria and fungi (142 references); G. Brownlee (pp. 197–208) deals with antibiotics (penicillins, streptomycin, and polymyxins), with particular reference to mode of action (44 references) [cf. ibid., 31, p. 29], J. G. Horsfall and A. E. Dimond (pp. 198–222) with plant chemotherapy (98 references) [cf. ibid., 31, p. 133], and A. J. Riker and A. C. Hildebrandt (pp. 223–240) with pathological plant growth (95 references) [cf. ibid., 25, p. 292]; J. W. Beard (pp. 265–276) discusses the physical and chemical characteristics of viruses (137 references) [cf. ibid., 28, p. 618], C. W. Bennett (pp. 295–308) interference phenomena between plant viruses (57 references) [cf. ibid., 12, p. 581; 15, p. 676; 28, p. 492], and G. A. Greathouse, C. J. Wessel, and H. G. Shirk (pp. 333–358) microbiological deterioration of manufactured materials (105 references) [cf. ibid., 28, pp. 584, 585; 30, pp. 528, 529].

McClean (R. C.) & Ivimey-Cook (W. R.). **Textbook of theoretical botany. Volume One.**—xv+1,069 pp., 962 figs., 80 diags., 1 graph, 3 maps, London, Longmans, Green & Co., 1951. 70*s*.

This comprehensive treatise is the first of four volumes covering the subject. The arrangement of the chapters follows the evolutionary sequence of treatment, the 'type' method being adopted. It aims to fill the gap between the numerous elementary surveys and works by specialists. Chapter VI (pp. 187–248) is devoted to the general characters of certain orders in the Archimycetes and Phycomycetes, a more detailed treatment being given to one representative of each group. In

Chapter VII (pp. 249–342) the Ascomycetes and Basidiomycetes are dealt with similarly, with detailed consideration of 11 examples. The classification, culture, pathogenicity of, and variation in bacteria and a general description of viruses are given in Chapter VIII (pp. 343–364). There is a glossary of prefixes and suffixes having Greek and Latin roots and a general index. Of the figures 727 are from photographs of original material taken by the authors.

Catcheside (D. G.). **The genetics of micro-organisms.**—vii+223 pp., 1 pl., 6 figs., 20 diags., 16 graphs, London, Sir Isaac Pitman & Sons, Ltd., 1951. 21*s*.

This authoritative work [cf. *R.A.M.*, 28, p. 25; 30, p. 280], which is of essential value and interest to medical students and biologists, is based on a course of lectures devised for biochemists specializing in the microbial aspects of their subject. Following an introductory chapter, II is concerned with genetic analysis in *Neurospora* [ibid., 29, p. 271] and other fungi, III with mutation [ibid., 30, p. 55] and gene action, IV adaptation and mutation, and V sexual reproductive systems [ibid., 29, p. 224], while VI to IX are devoted to particular genetical aspects of yeasts [ibid., 28, p. 320], protozoa, bacteria, and viruses. There is a bibliography of 222 references, each with a brief note on the subject matter, and a general index.

Edgerton (C. W.). **Plant pathological investigations in the United States V. Research in plant pathology and botany at Louisiana State University.**—*Plant Dis. Reptr, Suppl.* 206, pp. 193–201, 1951. [Multilithed.]

This is a history of the development of research work since 1906 on plant diseases at the Louisiana State University and the Agricultural Experiment Station, Baton Rouge [cf. *R.A.M.*, 31, p. 27], together with notes on mycological and weed control investigations.

Brodie (H. J.). **The splash-cup dispersal mechanism in plants.**—*Canad. J. Bot.*, 29, 3, pp. 224–234, 1 pl., 2 figs., 1951.

An account is given of the operation of the chief splash-cup types found in cryptogams. Raindrops cause the peridioles of the Nidulariaceae to be propelled over a distance of about 4 ft. by splash action. Several morphological features of fruit bodies of the Nidulariaceae appear to be related to the utilization of the energy of raindrops in rain dispersal. The sclerotium cups of *Aleurodiscus minnsiae* function in a similar manner.

Van der Weele (S.). **A method for the isolation of fungistatic microorganisms active against a slowly growing mold : Venturia inaequalis (Cooke) Wint.**—*Antonie van Leeuwenhoek J. Microbiol. Serol.*, 16, pp. 3–8, 2 figs., 1950.

A description is given of a cellophane technique [cf. next abstract] adapted from that of A. Gratia (*C.R. Soc. Biol., Paris*, 138, p. 893, 1944) for the isolation from soil of fungistatic antagonists active against *Venturia inaequalis*. The method consists in covering the lower side of a glass ring, 10·5 cm. by 1·3 cm. high, with a moist sheet of cellophane (grade P.T. 400), thus forming a cellophane dish which, after steam sterilization, is placed in a sterile glass box and partly filled with a starch or a casein nutrient agar medium suitable for the development of numerous types of soil organisms. The plate is then inoculated with a dilution of ordinary garden soil, dried, and incubated for about three days at 30° C. When the colonies have developed the glass box is inverted with the ring now resting on its lid. On the slightly sunken cellophane surface about 20 ml. of malt agar, previously mixed with a suspension of *Venturia* conidia at a temperature not over 43°, is poured. To prevent strong stimulation of the soil fungi a neutral or slightly acid agar of 1° Balling malt is used. Inhibition zones are visible in a week at 17°. Numerous

active strains, mostly belonging to the genus *Streptomyces* [*R.A.M.*, 30, pp. 482, 577], were isolated. One drawback of the cellophane technique is that antibiotics which do not diffuse through the sheet cannot be recognized.

Maravalhas (N.). **Novo método para isolamento de microorganismos fungoestáticos do solo.** [A new method for the isolation of fungistatic micro-organisms from the soil.]—*Dusenia*, 2, 1, pp. 21–24, 1 diag., 1951. [English summary.]

The author's proposed modification of van der Weele's method for the isolation of fungistatic micro-organisms from the soil [see preceding abstract] consists in the replacement of the glass ring by an aluminium or stainless steel interlock frame which holds the cellophane sheet firmly in the centre of the culture dish.

Curtis (P. J.), Hemming (H. G.), & Unwin (C. H.). **Albidin, an antibiotic red pigment from Penicillium albidum.**—*Trans. Brit. mycol. Soc.*, 34, 3, pp. 332–339, 1951.

Studies at Imperial Chemical Industries, Butterwick Research Laboratory, Welwyn, Hertfordshire, on a red pigment, albidin, produced by *Penicillium albidum* (J. P. Curtis & J. F. Grove, *Nature, Lond.*, 160, pp. 574–575, 1947), showed that in Weindling's medium (pH 3·5) it prevented germination of *Aspergillus niger*, *A. terreus*, *Botrytis allii*, *Fusarium graminearum* [*Gibberella zeae*], *F. caeruleum*, *Myrothecium verrucaria*, *Penicillium brevi-compactum*, *P. digitatum*, *P. expansum*, *P. gladioli*, *Stachybotrys atra*, *Stemphylium* sp., *Trichoderma viride*, and *Verticillium cinnabarinum* at concentrations of 1·6, 0·8, 0·2, 0·04, 0·4, 1·6, 0·4, 0·8, 1·6, 0·4 ,3·1, 3·1, 3·1, and 3·1 μgm. per ml., respectively. A second, colourless substance melting at 156° C. and giving a deep green colour with ferric chloride was obtained from the mould; this was active against *B. allii* at 25 μgm. per ml.

Roizin (M. B.). Неплесневеющая побелка хранилищ плодов, Овощей и Картофела. [Mould-resistant whitewashing for vegetable and Potato store rooms.] –Докл. Ленина Акад. сельскохоз. наук. [*Rep. Lenin Acad. agric. Sci.*], *1951*, 9, pp. 39–41, 1951.

At the Pan-Soviet Scientific Research Institute of Refrigerator Construction a new mould-resistant whitewashing spray, 'antimycosis', which had given satisfactory results both above and below freezing point in cold-storage rooms, was also found to be efficacious when applied to the outside of battens, plywood, and concrete and cement plasters [see next abstract] in potato and vegetable store rooms. To prevent [unspecified] mould growth 0·8 to 2 per cent. sodium fluoride [*R.A.M.*, 30, pp. 7, 398, 441] was used in the whitewashing mixture. A higher concentration of antiseptic was required for the impregnation of a natural limestone surface or one covered with lime plaster. Antimycosis, while rendering wooden parts in store rooms mould-resistant from the outside, did not prevent rotting from the inside. Wooden materials should be treated with fluoride antiseptics before building.

Nicot (Jacqueline). **Dégradation des murs de plâtre par les moisissures.** [Degradation of plaster walls by moulds.]—*Rev. Mycologie*, 16, 2, pp. 168–172, 1951.

A study was made of fungi growing on various parts of a wine warehouse under humid conditions. Greenish-black spots on the plaster walls yielded primarily *Cladosporium herbarum* [*R.A.M.*, 24, p. 240; 31, p. 136] and *Penicillium waksmani* [ibid., 30, pp. 59, 577], *P. implicatum*, a *P.* species of the *brevi-compactum* group, and, less abundantly, a species of *Phoma*. Floccose pink patches were due to *Cephalosporium acremonium*, but *Penicillium italicum*, *P. frequentans*, and *Cladosporium*

herbarum were also isolated from these. *Phoma pigmentivora* and another *P.* sp., which may be *P. hibernica*, were associated with *C. herbarum*, *Penicillium waksmani*, and *Cephalosporium acremonium* on the cement underlying the plaster. The paintwork [cf. loc. cit.] of the door yielded pure cultures of *P. waksmani* and occasionally *Cladosporium*.

C. herbarum and the *Phoma* spp. appeared to be the most virulent of the various organisms isolated when used for inoculating damp plaster in test-tubes. Experiments in the laboratory and *in situ* indicated that the best method of control at present is to ensure adequate aeration and ventilation to disperse the alcohol fumes, to scrape the affected parts of the wall until smooth, and to treat them about every two months with a 1:5,000 neutral *o*-oxyquinoline sulphate solution [loc. cit.] or less frequently with products having a base of quaternary ammonium salts.

Mehrotra (B. S.). **Physiological studies of some Phytophthoras. III. Carbon requirements.**—*Lloydia*, 14, 2, pp. 122–128, 1 graph, 1951.

In studies in the Department of Botany, University of Allahabad, India, the relative growth-supporting values of various carbon compounds were determined quantitatively for several *Phytophthora* species [cf. *R.A.M.*, 28, p. 636]. Maltose, sucrose, soluble starch, and dextrose were the carbohydrates best utilized by *P. cactorum*, *P. citricola* [*P. cactorum*], *P. fagi* [*P. cactorum*], *P. meadii*, *P. paeoniae* [*P. cactorum*], *P. parasitica* and its vars. *nicotianae* and *piperina*, *P. pini* [*P. cactorum*], and *P. richardiae*. Of the alcohols tested glycerol and sorbitol were the best sources of carbon. In each case growth was accompanied by acidification of the medium.

Becker (Yvette), Guillemat (J.), Guyot (L.), & Lelièvre (D.). **Sur un aspect phytopathologique du problème des substances racinaires toxiques.** [On a phytopathological aspect of the problem of toxic root substances.]—*C.R. Acad. Sci., Paris*, 233, 2, pp. 198–199, 1951.

The incorporation in the soil of the root debris of phanerogams which excrete toxic substances, e.g., *Hieracium pilosella*, has been shown by the authors' studies in France to upset the equilibrium of the bacterial and fungal microflora of the rhizosphere. The selective action exerted in the toxins tends to enhance the pathogenicity of certain fungi carried on seed or present in the soil and to aggravate the diseases, such as damping-off, which they cause in young plants.

The following results were obtained in an experiment with broad bean seeds sown in soil taken from the rhizosphere of the non-toxic *Brachypodium pinnatum*: (*a*) untreated, mean height of plants 10·6 cm., germination 92 per cent., infected seeds 0, and seeds bearing traces of *Fusarium* 0; (*b*) with a 5 per cent. admixture of pulverized *H. pilosella* roots, 7·3 cm., 68, 28, and 14 per cent., respectively; (*c*) with 10 per cent. of the same, 1·1 cm., 32, 46, and 70 per cent., respectively; and (*d*) with 25 per cent., 1 cm., 28, 70, and 88 per cent., respectively.

Webb (R. E.), Larson (R. H.), & Walker (J. C.). **Naturally occurring strains of the Potato leaf roll virus.**—*Amer. Potato J.*, 28, 7, pp. 667–671, 2 figs., 1951.

The results of studies at the University of Wisconsin and the United States Department of Agriculture, Madison, of isolates of potato leaf roll virus [*R.A.M.*, 30, p. 532] from 56 seed potato areas in the United States and Canada [ibid., 31, p. 53], confirm the existence of four strains of the virus as tested on *Physalis floridana* [ibid., 27, p. 493]. Strains 1, 2, and 3, common in Wisconsin, were also collected in many other areas, while strain 4 was represented by one isolate from South Dakota. Symptoms were expressed on *P. floridana* after preconditioning at an optimum temperature of 24° C. and 16 hours daylight. Strain 1 caused mild

chlorosis, moderate leaf rolling and basal cupping, mild to moderate petiole epinasty without twisting, and mild stunting; recovery was rapid and subsequent growth only slightly below that of normal plants. Strain 2 incited moderate chlorosis, rolling and basal cupping of the leaves, mild to moderate epinasty and twisting of the petioles, and moderate plant stunting; recovery was fairly rapid, but growth somewhat less than with strain 1. Strain 3 produced severe chlorosis, leaf rolling and basal cupping, epinasty and twisting of the petioles, and severe stunting; the plants recovered slowly but remained severely stunted. Strain 4 caused very severe chlorosis, leaf rolling and cupping, severe petiole epinasty and twisting, very severe stunting, and finally defoliation and death of the plant. Further studies on the effect of each strain on a number of potato varieties under controlled conditions are in progress.

Watson (D. J.). **Botany department.**—*Rep. Rothamst. exp. Sta., 1950*, pp. 55–59, 1951.

In an experiment by J. H. Wilson, in which rolled and unrolled leaves of potato plants infected with leaf roll virus [*R.A.M.*, 30, p. 339; 31, p. 76 and next abstracts] were removed from the plants, it was found that the net carbon assimilation rate of infected plants was lower than that of healthy ones only where rolled leaves were retained. It is concluded that assimilation by infected leaves is not reduced until rolling develops.

When Up-to-Date plants, tolerant of leaf roll, were compared with intolerant Craigs Defiance under conditions of low nitrogen supply, both varieties showed very severe symptoms. Addition of nitrogen appreciably reduced symptom severity in Craigs Defiance, while in Up-to-Date the symptoms were completely suppressed almost up to flowering time and were then only mild.

Experimental evidence indicated that leaf roll infection retards transport of materials (as indicated by dry matter estimates) from infected seed tubers to the developing shoots in intolerant varieties but has small effect in tolerant ones.

Wilson (J. H.). **The expression of symptoms of leaf-roll virus in Potatoes.**—*Ann. app. Biol.*, 38, 2, pp. 546–547, 1951.

In this paper read at a meeting of the Association of Applied Biologists, 8th November, 1950, the author states that a study at Rothamsted Experiment Station of the effects of nitrogen, phosphorus, potassium, and shading on the expression of leaf roll virus in potatoes [see preceding and next abstracts] showed that high nitrogen in the presence of phosphorus, particularly during early growth, gave the conditions most favourable for the masking of symptoms. Shading had only a slight masking effect, though more intense shading would probably have increased the relative importance of this factor. Symptoms were slightly intensified by the addition of potassium. It would seem that under certain field conditions symptom expression in tolerant varieties may be long delayed or even completely suppressed throughout the season.

Broadbent (L.) & Tinsley (T. W.). **Experiments on the colonization of Potato plants by apterous and by alate aphids in relation to the spread of virus diseases.** —*Ann. appl. Biol.*, 38, 2, pp. 411–424, 3 diags., 1951.

In experiments at Rothamsted Experimental Station, Harpenden, in 1947, 1948, and 1949, potted potato plants were placed in the field among plants infected with potato virus Y and leaf roll virus [*R.A.M.*, 30, p. 339 and above, p. 170]. Some of the potted plants were surrounded by sticky boards which prevented apterous aphids from reaching them. Almost as many plants within the boards as without became infected, indicating that spread was mostly by winged aphids. Apterae

probably spread the viruses throughout a hill after one or more stems had become infected. They may bear infection to neighbouring plants, but most of these have already been infected by alatae. The number of plants that became infected was unaffected by watering.

Gibson (K. E.), Landis (B. J.), & Klostermeyer (E. C.). **Effect of aphid control on the spread of leaf roll in Potatoes.**—*Amer. Potato J.*, 28, 7, pp. 658–666, 1 graph, 1951.

In 1949 experiments were carried out at Yakima, Washington, to determine the effect of controlling *Myzus persicae* and *Macrosiphum solanifolii* on the spread of leaf roll [see preceding abstracts] in Netted Gem (Russet Burbank) potatoes. In two experiments with early-planted potatoes dusts containing 4 per cent. DDT plus 80 per cent. sulphur, 5 per cent. DDT plus 75 per cent. sulphur, or 5 per cent. DDT alone all gave good aphid control, with leaf roll incidence not exceeding 5·8 per cent. In both early- and late-planted plots aphid populations were highest where 33·3 per cent. sodium fluoaluminate dust was applied, leaf roll incidence being 23 and 61·3 per cent., respectively. The dust containing 5 per cent. DDT and 75 per cent. sulphur gave the best aphid control throughout the season, leaf roll incidence being 43·1 per cent. Parathion gave good control when aphid migration had abated, leaf roll incidence not exceeding 43 per cent.

Bawden (F. C.) & Kassanis (B.). **Serologically related strains of Potato virus Y that are not mutually antagonistic in plants.** *Ann. appl. Biol.*, 38, 2, pp. 402–410, 1951.

Further studies were conducted at Rothamsted Experimental Station, Harpenden, on potato virus Y [*R.A.M.*, 27, p. 332] using strains Y1, potato virus C [a strain of virus Y], and tobacco veinal necrosis virus. The last-named was isolated at the Commonwealth Potato Collection from a naturally infected potato plant collected in South America and is possibly identical with Nobrega and Silberschmidt's 'vein necrosis' virus [ibid., 24, p. 430]. Veinal necrosis virus is serologically related to Y and C. It does not protect tobacco, *Nicotiana glutinosa*, or potato from infection by them, and tobacco and *N. glutinosa* plants infected with either Y or C remain susceptible to it. There is some evidence that it does not multiply normally in potato plants infected with virus Y and that it is sometimes suppressed in such plants.

That tobacco veinal necrosis virus possesses antigenic groups in common with viruses Y and C is considered to justify its identification as a strain of virus Y and to be of greater taxonomic significance than failure to afford protection against other strains. It also differs from other strains in showing more virulence towards tobacco than towards potato.

Livermore (J. R.). **The Canoga Potato.**—*Amer. Potato J.*, 28, 7, pp. 672–674, 1951.

The Canoga potato was produced in 1940 at Gabriels, Franklin County, New York, as seedling No. 2V2452 from the cross (Albion × Katahdin) × Katahdin. For six years prior to its release in 1950 only a trace of leaf roll [see preceding and next abstracts] was recorded, but that year a fairly high percentage of the plants were classified as infected. At no time, however, have the tubers shown any symptoms of net necrosis or any other internal discoloration.

Krüger (F. H.). **Über den Einfluss einseitiger Düngung auf den Kartoffelabbau.** [On the influence of unbalanced fertilizing on Potato degeneration.]—*Z. Acker -u. PflBau* (formerly *J. Landw.*), 93, 3, pp. 359–385, 2 graphs, 1951.

A comprehensive, tabulated account is given of experiments carried out from 1945 to 1949 at the Institute for Agriculture of the University of Göttingen,

Germany, to determine the influence of fertilizers on the state of health of the potato crop [*R.A.M.*, 29, p. 424].

The so-called E-field, which has been in continuous use for experimental purposes for 75 years, was divided into eight plots of 50 sq. m. each, of which one was left untreated and the others amended with potassium (240 kg. per ha.), nitrogen (78 kg.), or phosphorus (65 kg.), and combinations of these [cf. above, p. 200]. They were planted with healthy seed of the Böhms Mittelfrühe variety. During the period covered by the trials virus degeneration (no evidence of physiogenic deterioration [ibid., 29, p. 226] was observed) was represented almost exclusively by leaf roll; crinkle [virus X+virus A], which predominated from 1935 to 1943, was virtually absent. Leaf roll plants treated with soil amendments favourable to the host, especially nitrogen, showed all degrees in symptom expression between full and reduced vigour, suggesting that low percentages of the virus are carried in a masked form. The size of the yields in the years following the treatments was dependent on the incidence of leaf roll and did not appear to be affected by the choice of fertilizer.

The influence of nitrogen was expressed in the complete fertilizer and potassium-nitrogen plots by a distinct enhancement of susceptibility to leaf roll and a type of leaf development congenial to its aphid vectors, thereby increasing their numbers. Potassium likewise aggravates susceptibility to leaf roll, but its exclusive use tends to repel aphid invasion. It was also observed that an extreme shortage of this element, resulting in the extensive premature withering of the foliage, may promote freedom from leaf roll.

Köhler (E.) & Ross (H.). **Das Verhalten deutscher Kartoffelsorten gegenüber verschiedenen Stämmen des X-Virus im Pfropfversuch.** [The reaction of German Potato varieties to different strains of virus X in the grafting test.]—*Züchter*, 21, 6, pp. 179–185, 1951.

In this joint contribution from the Virus Research Institute, Celle, and the Max Planck Plant Breeding Institute, Voldagsen, Germany, a tabulated account is given of experiments by the grafting method to determine the reactions of 53 potato varieties to nine strains and two populations of potato virus X [cf. *R.A.M.*, 23, p. 143] from the latent varieties Jubel and Erstling [Duke of York].

None of the varieties proved to be hypersensitive to all the strains and populations used. Condor, Heida, Hilla, and Parnassia, hypersensitive to none, are exposed to particularly grave risks in the field. Havilla, Monika, and Stella are hypersensitive to seven strains, while Allerfrüheste Gelbe, Cuculus, Frühnudel, and Ostbote react similarly to the two populations. Ro 7, a moderately severe strain isolated in 1950 from Robusta, did not induce a hypersensitive response on any of the varieties tested. Jubel, with its population of very weak strains, is well suited to act as a carrier in hypersensitivity tests. None of the varieties reacted to all the X^N [ibid., 31, p. 138] strains by the production of necroses and to all those of X^E group [ibid., 22, p. 109] by the absence of this symptom, nor did the reverse occur. The 'laboratory strains' of potato virus X maintained on tobacco for lengthy periods did not differ in their effects from those derived directly from potato.

Asuyama (H.) & Komuro (Y.). **Studies on the classification of Potato viruses. II. A complex of viruses inducing crinkle mosaic of Potato variety 'Benimaru'.**—*Ann. phytopath. Soc. Japan*, 15, 2, pp. 49–54, 1951. [Japanese, with English summary.]

Transmission experiments demonstrated that in Japan potato crinkle virus [*R.A.M.*, 14, p. 524; cf. line 10 above] is a complex of viruses X and Y. In the Benimaru variety crinkle mosaic appears as a mottling of the upper six or

seven leaves which remains distinct throughout the growth of the plant, but may tend to be masked in the hot season. This symptom is followed by a waviness of the leaflet margins. Inoculation of apparently healthy Benimaru plants with X+Y or Y gave characteristic symptoms, and it was discovered that the plants were already infected by a mild strain of virus X.

Turkish tobacco, *Nicotiana longiflora*, *N. glutinosa*, tomato, and *Solanum nigrum* were found to be infected by both virus X and virus Y. *Datura stramonium*, *Capsicum annuum*, and eggplant were susceptible to X, but not to Y. Inoculations with sap from affected tubers shortly after harvesting or from stored tubers immediately before planting resulted in infection of tobacco plants by Y, though the percentage of successful inoculations was lower than with X.

The X virus used in this experiment was tolerant of heating at 70° to 75° C. for ten minutes, to dilution at 1 in 100,000, and to ageing *in vitro* for 72 days. It passed through the Zeitz filter L_3 (Shofu). The Y virus tolerated heating at 55° to 60° for ten minutes, a dilution of 1 in 500 to 1 in 1,000, and ageing for 1 to 2 days; it did not pass through the same filter.

Murayama (D.), Yamada (M.), & Matsumiya (H.). **Immunological studies on the Potato virus diseases. II. Detection of X virus in the apparently healthy Potatoes.**—*Ann. phytopath. Soc. Japan*, 15, 2, pp. 55–60, 1951. [Japanese, with English summary.]

Part of the work described in this paper has already been noticed from another source [*R.A.M.*, 31, p. 76], but mention may be made of the following points. The five varieties of the Shima Line averaged only 20 per cent. infection with virus X [see preceding abstract] in Hokkaido, Japan. Plants raised from true seed were infected to the extent of 3·8 per cent. Complement fixation was not sensitive enough for the material used, but the slide flocculation method was highly sensitive.

Garber (R. H.), Schaal (L. A.), & Fults (Jess L.). **The selective action of penta-. chlorophenoxyacetic acid against Streptomyces scabies (Thaxt.) Waksman & Henrici in culture media.**—*Phytopathology*, 41, 11, pp. 991–996, 2 figs., 1951.

At the Colorado A & M College, the growth of a strain (No. 128) of *Streptomyces* [*Actinomyces*] *scabies* isolated from soil near Fort Collins was limited in a modified potato dextrose agar medium by a synthetic plant hormone, pentachlorophenoxyacetic acid, at concentrations of 32 and 64 p.p.m. and inhibited at 125 p.p.m. [*R.A.M.*, 29, p. 583]. The action of the chemical was regarded as fungistatic between 32 and 500 p.p.m. and fungicidal at 1,000 and 2,000 p.p.m. Two bacteria and two forms of *Penicillium notatum* from soil samples were more tolerant of pentachlorophenoxyacetic acid than was *A. scabies*, thereby demonstrating the selective effect of the compound.

The results of preliminary field tests in northern Colorado indicate that the hormone, applied to the soil at 1 or 10 lb. per acre, significantly reduces the incidence of scab on Bliss Triumph potatoes.

Ark (P. A.) & Oswald (J. W.). **Antibiotic potentialities of some strains of Streptomyces scabies.**—*Phytopathology*, 41, 11, p. 1034, 1951.

At the University of California, Berkeley and Davis, marked antibiotic tendencies were observed among several of the 40 strains of *Streptomyces* [*Actinomyces*] *scabies* investigated from this standpoint. Introduced in the form of disks from potato dextrose agar cultures on to plates of the same medium seeded with *Fusarium oxysporum* and *Verticillium albo-atrum*, the potato scab strains produced zones of inhibition ranging from 0 to 20 mm. Most of those exerting strong antibiotic activity were cultural mutants from strains of a very high original pathogenicity.

Hopf (Maria). **Untersuchungen an Kartoffelknollen über eine Beeinflussung ihrer Phytophthora infestans Resistenz durch Insektizide. Vorläufige Mitteilung.** [Studies on the effect of insecticides on the resistance of Potato tubers to *Phytophthora infestans*. Preliminary note.]—*NachrBl. dtsch. PflSchDienst, Berl.*, N.F., 5, 4, pp. 74–75, 1951.

Experiments were performed to determine the effect of three applications during the summer of 1950 to Aquila and Capella potato crops of overdosages of hexa [chlorobenzene] preparations, heavily adulterated and with varying content of the gamma-isomer, phosphoric acid esters of hexachlorobenzene, and DDT, on the resistance of the tubers, after three to four months' storage, to inoculation with three biotypes of *Phytophthora infestans* [*R.A.M.*, 30, p. 625; 31, p. 138]. The most virulent, Ph 1, grew equally well on treated and untreated material of both varieties, but Ph 2 and Ph 3, moderately and weakly virulent, respectively, developed much more luxuriantly on the treated tubers, especially in the heavily adulterated hexa series, the phosphoric acid esters being virtually devoid of influence in this direction.

Hyre (R.) & Horsfall (J. G.). **Forecasting Potato late blight in Connecticut.**—*Plant Dis. Reptr*, 35, 10, pp. 423–431, 1 fig., 5 graphs, 1951. [Multilithed.]

Analysis of data obtained from Hartford and New Haven, Connecticut, in relation to the incidence of potato blight (*Phytophthora infestans*) [cf. *R.A.M.*, 29, p. 115; 30, p. 451] for the period 1902–50 indicates that it is possible to predict the occurrence of the disease with about 80 per cent. accuracy by means of a critical cumulative rainfall line and weekly mean temperatures. In only one year out of 49 was blight severe when the forecast would have been for no blight.

Werner (H. O.) & Sandsted (R. F.). **Performance of scab resistant Potato varieties in western Nebraska.**—*Amer. Potato J.*, 28, 7, pp. 645–658, 1 diag., 3 graphs, 1951.

The late potato varieties Ontario, Menominee, and Cayuga produced fewer tubers affected by scab [*Actinomyces scabies*: *R.A.M.*, 30, p. 579; 31, p. 139] than any of the other four commercial varieties tested in irrigated and dryland soil in western Nebraska during 1948 and 1949, although the tubers were not up to grade 1 standard. Scab was more prevalent on Yampa [ibid., 29, p. 51] and Russet Sebago than on the above varieties. Progress appeared to be the most desirable variety for western Nebraska since it showed a relatively low incidence of mild types of scab and sometimes less than Russet Sebago in fields where the disease was very severe. Triumph [ibid., 29, p. 168] produced a higher percentage of affected tubers with more scab of severe types than any of the varieties tested.

Suzuki (H.). **Studies on the relation between the susceptibility of pedicel of panicle ('hokubi') of Rice plant to blast disease caused by the low soil temperature and its anatomical characters.**—*Ann. phytopath. Soc. Japan*, 15, 2, pp. 72–78, 1951. [Japanese, with English summary.]

Two rice varieties resistant to blast (*Piricularia oryzae*) [*R.A.M.*, 31, p. 140], Kameji and Mubō-aikoku, and two susceptible varieties, Omachi and Kokuryō-miyako, were grown experimentally in Japan in flooded soil at 15·3° to 28·2° C. (low temperature series) and 16·5° to 34·8° (normal temperature series). The pedicels of the panicles in both series were inoculated with a spore suspension from a pure culture of the fungus when the plants in the low temperature series, which were about ten days later than the others, began to bloom. Disease development in all plants in the low temperature series was 75 to 100 per cent., whereas at

the normal temperature it was 0 to 13·3 per cent. for the resistant varieties and 20 to 33·3 per cent. for the susceptible.

The number of epidermal cells on which appressoria formed and the number of cells penetrated and infected by the fungus were for all varieties higher in the low than in the normal temperature series. Irrespective of the kind of cells examined these numbers were also higher in the susceptible than in the resistant varieties, this difference being more marked in the normal than in the low temperature series. The epidermal cells on which appressoria formed were more numerous than those penetrated by the fungus, which in turn were more numerous than infected cells. The numbers were greatest in the long cells of the non-stomatal zones, intermediate in the long and short cells in stomatal zones, and least in the accessory cells of the stomata, though the differences were less marked in the low than in the normal temperature series. Low soil temperature appears to decrease resistance of the pedicels by causing the fungus to form appressoria on the host cells.

In general the thickness of the outer epidermal wall and its silicated layer and the number of silicated short cells were much less in the low than in the normal temperature series. The same difference was noted between the susceptible and resistant varieties at normal temperature, though it was obscured at the low temperature. The outer epidermal wall and silicated layer were thinnest in the non-stomatal zone, intermediate in the stomatal zones, and thickest in the accessory cells of the stomata. These differences were not clear at the low temperature.

HASHIOKA (Y.). **Bacterial leaf blight of Rice and its control.**—*Agric. & Hort., Tokyo*, 26, pp. 644–648, 1951. [Japanese.]

The rice disease known as bacterial leaf blight, caused by *Bacterium* [*Xanthomonas*] *oryzae* [*R.A.M.*, 8, p. 461], is generally severe in the south-east of Japan, where the typhoon is often severe and the weather warmer than in the north-west. Plants wounded by the typhoon and manured with excess nitrogen are infected more readily than sound and potassium-fertilized plants. The disease occurs mostly after the heading stage has been reached, but sometimes infection comes from the seed-beds, where the causal bacteria overwinter in great numbers in the soil from any heavily infected preceding rice crop. The disease is partly controlled by spraying with copper fungicides just before the typhoon. 'Kidama' and certain other resistant varieties should be grown in the regions where the disease is severe year after year.

YOUNG (H. E.). **Mycology department.**—*Rep. Rubb. Res. Bd, Ceylon, 1950*, pp. 18–23, 1951.

In this report [cf. *R.A.M.*, 30, p. 191] it is stated that at Dartonfield *Hevea* rubber trees lightly infected with *Fomes lignosus* [loc. cit. and cf. 30, p. 512], even when treated with copper sulphate, all eventually succumbed to the disease. This control method has, therefore, been abandoned in favour of total eradication.

Die-back of trees to the ground occurred sometimes when several severe attacks of *Oidium heveae* were followed by invasion by *Diplodia* [*Botryodiplodia*] *theobromae* [ibid., 29, pp. 79, 229]. For the control of *O. heveae* [ibid., 30, pp. 342, 430; 31, p. 83] a power-driven mist blower was used successfully with concentrated lime-sulphur formulations, giving adequate protection for up to 14 days. It was particularly useful for the treatment of immature trees. Studies on the life-history of the fungus [ibid., 28, p. 194] showed that in some cases it sporulated from the edges of old lesions on mature leaves just at wintering, thus providing another source of infection in the early refoliation period. Promising initial results were obtained in culture on artificial media. *Hypocrella reineckiana*, parasitic on [unspecified] scale insects [ibid., 14, p. 428], was very common during the year.

Tixier (P.). **Oïdium des Hévéas.** [*Oidium* of *Hevea.*]—*Bull. agric. Congo belge*, 42, 3, pp. 671–674, 1951. [Flemish summary.]

This is a brief review of the history, symptoms, biology, and control of *Oidium heveae* on *Hevea* rubber [*R.A.M.*, 30, p. 541 and preceding abstract]. Sulphur treatment should be made between 8 a.m. and 10 a.m. at the rate of 18 to 20 kg. per ha., although it may be reduced to 5 to 10 kg. If permanganate at 125 gm. per cu. m. is used it must be followed by a dust application, since the permanganate does not stay on the plant.

Borget (M.). **Toxicité de cinq nouveaux fongicides pour quelques espèces de champignons hévéicoles : essais de laboratoire.** [Toxicity of five new fungicides to some fungi attacking *Hevea*: laboratory experiments.]—*Cah. Inst. Rech. Caoutch., Indoch.*, 4, pp. 1–13, 1949. [Abs. in *Hort. Abstr.*, 20, 3, pp. 279, 1950.]

Fungicides Nos. 31, 83, 99, 133, and 154, manufactured by Rhône-Poulenc, were compared with copper sulphate and paranitrophenol for their effect on growth and spore germination of *Corticium salmonicolor* [*R.A.M.*, 29, p. 229], *Phytophthora palmivora, Gloeosporium albo-rubrum, Botryodiplodia theobromae, Pestalozzia* [*Pestalotia*] *palmarum* [ibid., 29, p. 79], *Curvularia maculans* [ibid., 29, p. 277], and *Fusarium decemcellulare* [*Calonectria rigidiuscula*] attacking *Hevea* rubber [in Indo-China: ibid., 11, p. 432]. The results indicated that Nos. 154, 133, and 31 were worthy of field trials, the first against *Phytophthora palmivora* in particular and the second against *Corticium salmonicolor.*

Richardson (L. T.) & MacLachlan (D. S.). **The control of downy mildew of Hops in eastern Ontario.**—*Sci. Agric.*, 31, 8, pp. 345–348, 1951.

Following a serious outbreak of hop downy mildew (*Pseudoperonospora humuli*) in Prescott county, eastern Ontario, Canada, in 1944 [*R.A.M.*, 29, p. 406], spraying trials with various fungicides were carried out in commercial hop gardens at the Illustration Station, Fornouier, Ontario. Replicate plots were used in the preliminary trials in 1945 and 1946, and in 1947 and 1948 the tests were on a commercial scale, without unsprayed plots or border rows. Comparison of disease incidence and yields over the four-year period showed that the results obtained were consistent. The best results, from the standpoints of disease control, yield, and freedom from foliage injury, were given by Bordeaux mixture (10–10–100 and 10–5–100 were equally satisfactory and gave comparable yields) and fixed coppers. The highest yields in both 1947 and 1948 were given by COCS (copper oxychloride sulphate), and the cones were of good quality; cuprocide 54-Y (yellow copper oxide) gave good results in the early trials but was not available later. Spraying was superior to dusting. Orthex spreader-sticker added to the Bordeaux mixture increased its effectiveness at a very low cost. It is recommended that in eastern Ontario hops should be sprayed against *P. humuli* with 10–10–100 or 10–5–100 Bordeaux mixture or a fixed copper plus spreader-sticker from when the bines are six to eight feet high until the cones begin to form, at ten-day intervals in wet or fortnightly intervals in dry weather.

Thomas (C. A.). **The occurrence and pathogenicity of Phytophthora species which cause root rot of Safflower.**—*Plant Dis. Reptr*, 35, 10, pp. 454–455, 1951. [Multilithed.]

Phytophthora drechsleri caused serious root rot of safflower [*R.A.M.*, 30, p. 245] in commercial fields in several areas of the Great Plains and California in 1950, while isolates from similarly diseased plants in experimental plots at Beltsville, Maryland, were identified as *P. cactorum.* In greenhouse tests safflower variety N9 was more susceptible to both *P. parasitica* (from tomato) and *P. drechsleri*,

which were equally virulent, than to *P. cactorum* (from safflower and maple [*Acer*]). Variety N8 was resistant to all isolates tested.

WINTERS (H. F.). **Fumigation of Cinchona nursery soils.**—*Turrialba Rev. Inst. Cienc. agric.*, 1, 6, pp. 296–299, 2 figs., 1951.

Experiments were carried out from 1945 to 1949 in Puerto Rico to determine the value of various soil fumigants in preventing diseases caused by *Phytophthora* spp. [*R.A.M.*, 30, p. 343] in *Cinchona ledgeriana* nursery beds.

At Maricao liquid chloropicrin [loc. cit.] was injected into prepared, infected beds at the rate of 500 lb. per acre. One month later 100 plants were set in each plot. Survival was consistently better than in untreated plots, the average survival after nine months being 44·3 and 16·7 per cent., respectively, and the average height of plants 9·52 and 4·34 in., respectively.

In a similar experiment carried out at Toro Negro the treatments were: (*a*) larvacide (99 per cent. chloropicrin) applied at 300 lb. per acre by injecting 2 ml. at 8-in. intervals and at two-thirds the soil depth; (*b*) formaldehyde (40 per cent.) diluted to 5 tablespoons in 3 gals. water sprinkled at the rate of 4½ gals. per plot (15 sq. ft.); (*c*) D-D mixture at 300 lb. per acre injected as in (*a*); (*d*) fermate, 1 tablespoon in 1 gal. water, sprinkled at the rate of 4½ to 5 gals. per plot; (*e*) cyanogas at 5 tablespoons per plot mixed into the soil; and (*f*) no treatment. Growth was exceptionally good in all treatments; survival was almost 100 per cent. after six months and after twelve the differences were insignificant.

In the third experiment, also at Toro Negro, the treatments were larvacide, D-D mixture, and ethylene dibromide, all at 300 lb. per acre. In all cases 2 ml. were injected into holes 8 in. apart and 4 in. deep. After six months plants treated with chloropicrin were larger, more thrifty and ready for transplanting. The average survival, respectively, after nine months was 93·5, 82, and 85·5, with 89·5 per cent. for the control, and the average plant height 24·1, 12·2, 12·8, and 14·7 in.

Chloropicrin is recommended for further trial.

HES (J. W.). **The yellow spot disease.**—*Sug. News*, 27, 7, p. 288 (continued on p. 287), 1951.

In connexion with a note on yellow spot of sugar-cane (*Cercospora kopkei*) [*R.A.M.*, 28, p. 142] in Java, where the most susceptible varieties are P.O.J. 2878 and P.O.J. 100, E.K. 28, D.I. 52, and B 247 being relatively resistant, the writer states that the recommended fortnightly applications of a fungicidal dust [ibid., 11, p. 205] are effective, but generally unnecessary under local conditions since the infected canes tend to recover spontaneously.

CARVALHO (R. DE S.). **Carvão de Cana.** [Sugar-cane smut.]—*An. Esc. sup. Agric. 'Luiz de Queiroz', Piracicaba*, 6, pp. 1–12, 8 figs., 1949. [Abs. in *Hort. Abstr.*, 21, 3, p. 426, 1951.]

Information is given on the recent appearance of sugar-cane smut (*Ustilago scitaminea*) in the Alta Sorocabana district of Brazil [C.M.I. map No. 79] and on the control measures envisaged, viz., the destruction of susceptible varieties and propagation of resistant ones [ibid., 30, p. 193].

SMITH (A. H.). **Mushrooms in their natural habitats.** [Volume 1: xiv+626 pp., 11 figs.; Volume 2: 230 stereo-photographs].—Sawyer's Inc., Portland, Oregon, U.S.A., 1949. $26.50.

This interesting and instructive work provides an introduction to the study of the larger fungi. The first 129 pages supply notes on habits, habitats, morphology, and nomenclature of these fungi, methods of collecting and preparing specimens,

mycophagy, etc. A particularly useful section deals with laboratory techniques, reagents, and microscopic characters, accompanied by drawings of the various parts now considered important in taxonomy of the Basidiomycetes. The main part of Volume 1 gives descriptions and discussion of 230 species found in northern and western United States. A few Ascomycetes are included and some Tremellales, clavarias, polypores, boleti, Hydnaceae, and Gasteromycetes, but the majority of fungi treated are agarics. Literature references are provided, a glossary, and an index. Volume 2 is a series of disks bearing stereoscopic colour transparencies from photographs taken by W. B. Gruber in the natural habitats of the 230 species treated in Volume 1.

Ramsbottom (J.) & Balfour-Browne (F[rances] L.). **List of Discomycetes recorded from the British Isles.**—*Trans. Brit. mycol. Soc.*, 34, 1, pp. 38–137, 1951.

This list of British Discomycetes (with 3 pages of references) follows Boudier's system of classification and nomenclature as adapted by Ramsbottom in *Trans. Brit. mycol. Soc.*, 4, pp. 343–381, 1914. There is an index to genera and species, in which the names of imperfect states appear separately at the end.

Bazán de Segura (C[onsuelo]). **Plant diseases new to Peru.**—*Plant Dis. Reptr*, 35, 10, pp. 465–466, 1951. [Multilithed.]

The following plant diseases not previously recorded in Peru were noted in 1950: *Peronospora destructor* on onion [C.M.I. map No. 76; *R.A.M.*, 27, p. 122], *Phytophthora parasitica* on stems of *Araucaria excelsa* seedlings, *Sclerotinia sclerotiorum* on stems and leaves of *Brassica campestris*, *Pucciniopsis caricae* on papaw [ibid., 26, p. 403], *Colletotrichum gloeosporioides* [*Glomerella cingulata*] on orange [ibid., 23, p. 254], *Cordana musae* on banana [C.M.I. map No. 168], *Urocystis oxalidis* on tubers of *Oxalis tuberosa*, *Ascochyta phaseolorum* on bean (*Phaseolus vulgaris*) [*R.A.M.*, 1, p. 153; 27, p. 456], *Colletotrichum pisi* on pea [ibid., 26, p. 481], *Cladosporium* [*Fusicladium*] *carpophilum* [C.M.I. map No. 198] and *Coryneum beijerinckii* [*Clasterosporium carpophilum*: C.M.I. map No. 188] on peach, *Septobasidium pseudopedicellatum* [see above, p. 182] on stems of peach, apple, and pear, *Diplocarpon rosae* on rose [*R.A.M.*, 30, pp. 217, 370], and *Colletotrichum atramentarium* on potato [C.M.I. map No. 190].

Smith (G.). **Some new species of moulds and some new British records.**—*Trans. Brit. mycol. Soc.*, 34, 1, pp. 17–22, 2 pl., 1951.

Descriptions are given of the following moulds isolated or identified at the London School of Hygiene and Tropical Medicine: *Aspergillus thomii*, a laboratory contaminant; *Penicillium cyclopium* var. *album* n.var. from a banana fruit; *Nodulisporium africanum* from cellulose acetate film exposed for a durability test in West Africa, and *Circinella rigida* from soil in Suffolk. The following are newly recorded for Britain: *P. spiculosporum* [*R.A.M.*, 29, p. 481; 31, p. 75] on vegetable-tanned hide; *P. helicum* from soil, Suffolk; and *Petriella asymmetrica* [ibid., 30, p. 139] from chemically treated soil in Northern Ireland.

Proceedings of the Association of Applied Biologists.—*Ann. appl. Biol.*, 38, 2, pp. 525–549, 2 graphs, 2 diags., 1951.

A joint meeting of the British Mycological Society and the Association of Applied Biologists, in London, on 20th October, 1950, devoted to a symposium on 'The plant and the law' included the following papers, which are here reproduced: Legislation against plant diseases and pests in England and Wales (W. C. Moore), Inspection procedure in England and Wales (A. P. Winsor), The Progressive Wilt of Hops Order [*R.A.M.*, 27, p. 160] (W. G. Keyworth), and Some scientific aspects of the certification schemes for fruit plants [ibid., 28, p. 340] (R. V. Harris).